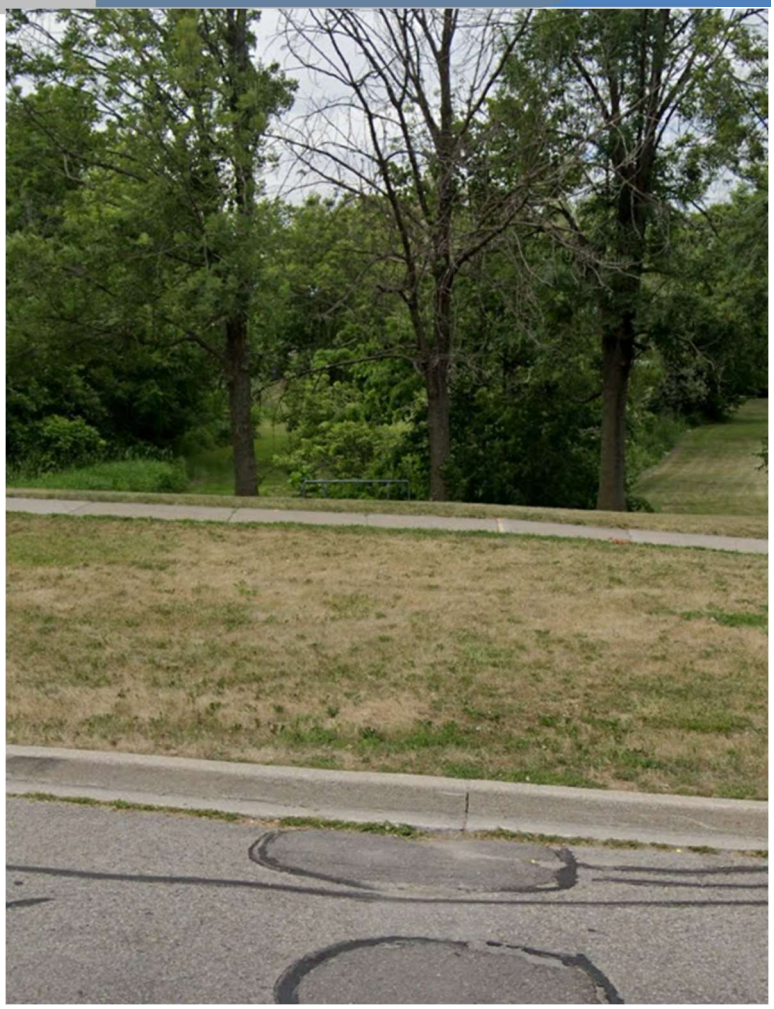
Prepared for:

City of Vaughan

REPORT PREPARED FOR:

JERSEY CREEK – VILLA PARK POND RETROFIT MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT AND CONCEPTUAL DESIGN



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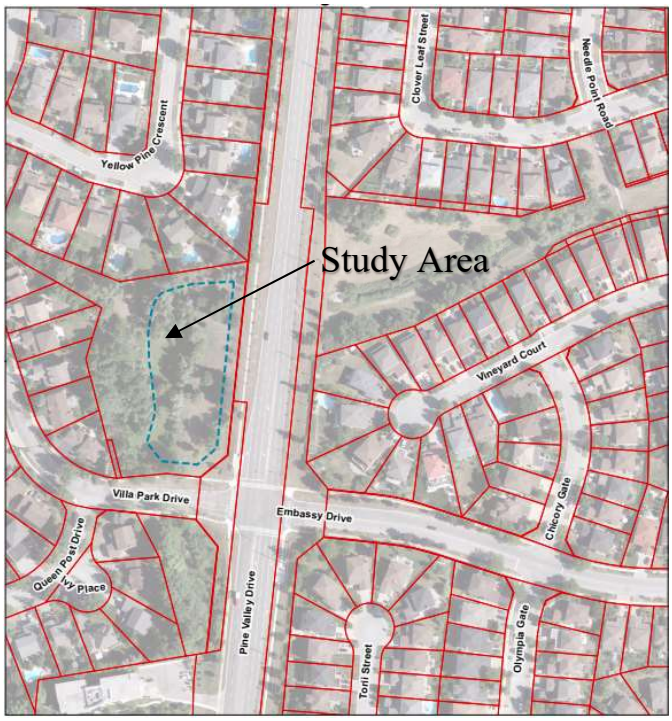
EXECUTIVE SUMMARY

INTRODUCTION

In 2009, the City of Vaughan Stormwater Management Retrofit Study was completed by Aquafor Beech Limited. Preliminary phases of the 2009 study identified existing quantity control facilities which had retrofit potential, and other existing urban areas where it was feasible to construct new Stormwater Management (SWM) facilities. A key recommendation of the 2009 retrofit study was to provide target water quality volumes for the proposed retrofit of these facilities to help meet enhanced level water quality criteria as per the MOE SWM Planning and Design Manual.



In 2019 the City of Vaughan applied for funding from the federal Disaster Mitigation Adaption Fund (DMAF) and selected 11 sites to proceed to the design phase for SWM improvements. Initially, these 11 sites were scoped under the Class EA Schedule as Schedule A$^+$. As part of the retrofit work for Villa Park Pond, designated as Pond 87 at Site 3, design for the reconstruction/restoration of the adjacent Jersey Creek was added to the scope of work. The study team concluded that the Class EA Schedule should be revised from a Schedule A$^+$ to a Schedule B in order to appropriately evaluate and manage the existing environmental conditions and future considerations caused by the potential impacts to the watercourse. Therefore, this report expands the Class EA Schedule A$^+$ and fulfils the requirements of a Class EA Schedule B for the proposed SWM retrofit design of Villa Park Pond (Site 3) and the Jersey Creek restoration work.

STUDY PURPOSE

The overall objective of this Class EA is to select a preferred design alternative for the stormwater management retrofit of Villa Park Pond and the restoration of the connecting Jersey Creek channel with the goal of improving overall water quality. Additional objectives include the improvement/restoration of local aquatic and terrestrial habitat, improvement of baseflow and instream temperature regimes, the improvement of future operations and maintenance activities and the retrofit of existing concrete channels so as to represent a more natural stream channel design.

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT (EA) PROCESS

The current study has been classified as a Schedule 'B' project and follows Phases 1 and 2 of the planning and design process with Phase 5 to follow at a subsequent stage. This report outlines Phases 1 and 2 of the EA process.

PHASE 1 – PROBLEM AND OPPORTUNITY DEFINITION

Constructed prior to the implementation of modern stormwater management planning, the Villa Park Pond, which is located in Woodbridge, Vaughan was originally constructed as a dry pond facility discharging untreated runoff for water quality into the receiving Jersey Creek watercourse. The City of Vaughan has initiated the design phase for this project under funding from the federal Disaster Mitigation Adaption Fund (DMAF), and ultimately intends to tender the project for construction along with other sites that received similar funding. Prior to the commencement of work, this Class EA will identify and evaluate the alternative solutions to permit the retrofit of the Villa Park Pond and the restoration of the downstream channel of Jersey Creek.

Completing these options will require making potential arrangements, including consultation and permitting with approval agencies.

PHASE 2 - EVALUATION OF ALTERNATIVE SOLUTIONS

Definition of Existing Conditions

A variety of information was collected and reviewed in order to define existing conditions. In addition to collecting and reviewing existing information, fieldwork was undertaken in order to better define existing conditions.

A summary of the existing conditions is provided below.

Natural Environment

The study area is located in the Peel Plain physiographic region of southern Ontario. The existing facility is located adjacent to Jersey Creek, a tributary of the East Humber River.

An Environmental Impact Statement was completed by Aquafor Beech in 2022 for the study area. The majority of vegetation on the site consists of open meadow parkland with scattered mature trees throughout and a smaller area of deciduous forest along the western edge. All vegetation

community types found on the site are common and secure in Ontario. Wildlife species that were observed incidentally include species common to suburban areas such as Eastern Cottontail (*Sylvilagus floridanus*), Eastern Gray Squirrel (*Sciurus carolinensis*), and American Robin (*Turdus migratorius*). No SAR or Species of Conservation Concern (SOCC) were observed by Aquafor.

While evidence provided in the Fisheries Management Plan suggests that the tributary to the East Humber River provides habitat to a variety of fish species, the habitat present within the immediate study area upstream of Villa Park Drive is highly fragmented and of low quality, suggesting that this extensive species list is not supported by the habitat found at the study site.

Socio-Economic Environment

The area surrounding the existing Villa Park Pond facility is a residential neighborhood within the community of Woodbridge. The land use for the SWM facility is zoned as "Open Space". The surrounding area is highlighted as "Residential", with additional "Open Space" zoning to the south of the retirement facility.

Pine Valley Drive is a major north-south arterial that extends through the area in Vaughan, and includes ramp access to Highway 407 to the south of the study area. Therefore, it acts as a significant access point for the surrounding residential neighborhood. Villa Park Drive is a smaller residential road that provides connectivity for the residential neighborhood bounding the west side of Pine Valley Drive.

The study area lies within the regulated area of the Toronto and Region Conservation Authority (TRCA) and will therefore require permitting to proceed with design and construction of the proposed retrofit.

EVALUATION OF ALTERNATIVES

Three alternative solutions were initially developed to address the problem and associated issues as noted above. The three alternatives are described briefly below.

Alternative #1 – Do Nothing

This alternative is traditionally carried forward as a benchmark in the Environmental Assessment process. For the purpose of this study the "Do-Nothing" alternative would essentially equate to maintaining the existing Villa Park Pond facility as a dry pond. The facility would continue to receive runoff from the north inlet (29 hectare contributing area) as well as the northeast inlet (205 hectare area).

Alternative #2 – Off-Line Stormwater Management Wet Pond Facility and Creek Realignment

This alternative involves upgrading the existing Villa Park Pond to include the design of a wet pond with a separation berm installed between the proposed pond and the adjacent creek channel to disconnect inflows from the northeast inlet. The pond would therefore remain off-line, with contributing flows from the north inlet receiving water quality benefits.

Alternative #3 – On-Line Stormwater Management Wet Pond Facility
This alternative involves upgrading the existing Villa Park Pond to include the design of a wet pond where the existing channel will be allowed to flow through the facility. The pond would therefore remain on-line, with contributing flows from both the north and northeast outlets continuing to contribute to the facility.

SELECTION OF THE PREFERRED ALTERNATIVE

Based on the results of the alternatives evaluation and in consultation with the City, agencies and the public, Alternative #2 (Off-line pond facility) was selected as the preferred alternative. In summary, this alternative has a nominal impact on the natural environment, is preferred with respect to impact on adjacent residents and commuters, is the most cost-effective, has no requirements from a property acquisition perspective and is technically feasible.

Implementation

The next steps for implementation of the preferred alternative will include:

- Detailed design and associated investigations
- Approvals
- Contract document preparation and tender; and
- Construction

The estimated cost to construct is $3,180,000 which includes 25% for engineering design and contingencies. Appendix A provides further details with respect to the cost breakdown.

Public Consultation

Because the project was initially phased as a Schedule A/A$^+$ and during the design process determined to require a Schedule B level of assessment, a single Public Information Centre (PIC) was held. The PIC described the study area, defined problems and opportunities, presented three alternatives and evaluation criteria for rating the alternatives, and identified a preliminary preferred solution. A summary of the findings and input from the public meeting is provided in Section 4.6.

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1 INTRODUCTION

1.1 Background

Aquafor Beech Limited has been retained by the City of Vaughan to undertake a Class Environmental Assessment for retrofit of the existing Villa Park Pond SWM facility identified as having the potential for retrofit to incorporate water quality control features together with the channel connecting this facility.

The Villa Park Pond in Woodbridge, Vaughan (see **Figure 1.1**) was originally constructed as a dry pond facility discharging untreated runoff for water quality into the receiving Jersey Creek watercourse. Local monitoring data and general industry experience have shown that these uncontrolled discharges are responsible for a significant portion of the contaminant loadings to receiving streams as well as increasing the potential for downstream erosion and flooding.

The City of Vaughan Stormwater Retrofit Study (2009) was initiated to provide a framework for a long-term strategy to implement stormwater quality/quantity and erosion control within the existing urbanized areas of the city. The study found that for the Villa Park Pond (Site 3 – Pond 87), objectives should be to design and construct a new stormwater management pond with a maximum storage capacity volume of 6,216 m^3 to treat incoming runoff to the recommended Enhanced Level 1 (80% TSS removal efficiency) as defined in the MOE SWM Planning and Design Manual (SWMPD Manual, 2003).

Initially, the project was identified under the Class EA as a Schedule A^+, and Aquafor Beech proceeded with the conceptual design of the pond retrofit. Restoration of the adjacent channel of Jersey Creek was added to the scope of the project, and it was determined that to evaluate and manage the existing environmental conditions and future considerations caused by the potential impacts to the watercourse, a Class EA Schedule B study should be carried out. Confirmation of the process was confirmed with MECP.

1.2 The Class Environmental Assessment Process

The Municipal Class Environmental Assessment (Class EA), Municipal Engineers Association (MEA) document (October 2000, as amended in 2007, 2011 and 2015), describes the process that municipalities must follow in order to meet Ontario's Environmental Assessment requirements for water, wastewater and road projects, including Master Plans. Depending on the individual project or Master Plan to be completed, there are different processes that municipalities must follow to meet Ontario's Environmental Assessment requirements.

Class Environmental Assessments (Class EAs) are prepared for approval by the Minister of the Environment. A Class EA is an approved planning document that defines groups of projects and activities and the Environmental Assessment (EA) process which the proponent commits to for each project undertaking. Provided the process is followed, projects and activities included under the Class EA do not require formal review and approval under the EA Act. In this fashion, the Class EA process expedites the environmental assessment of smaller, recurring projects.

Figure 1.1

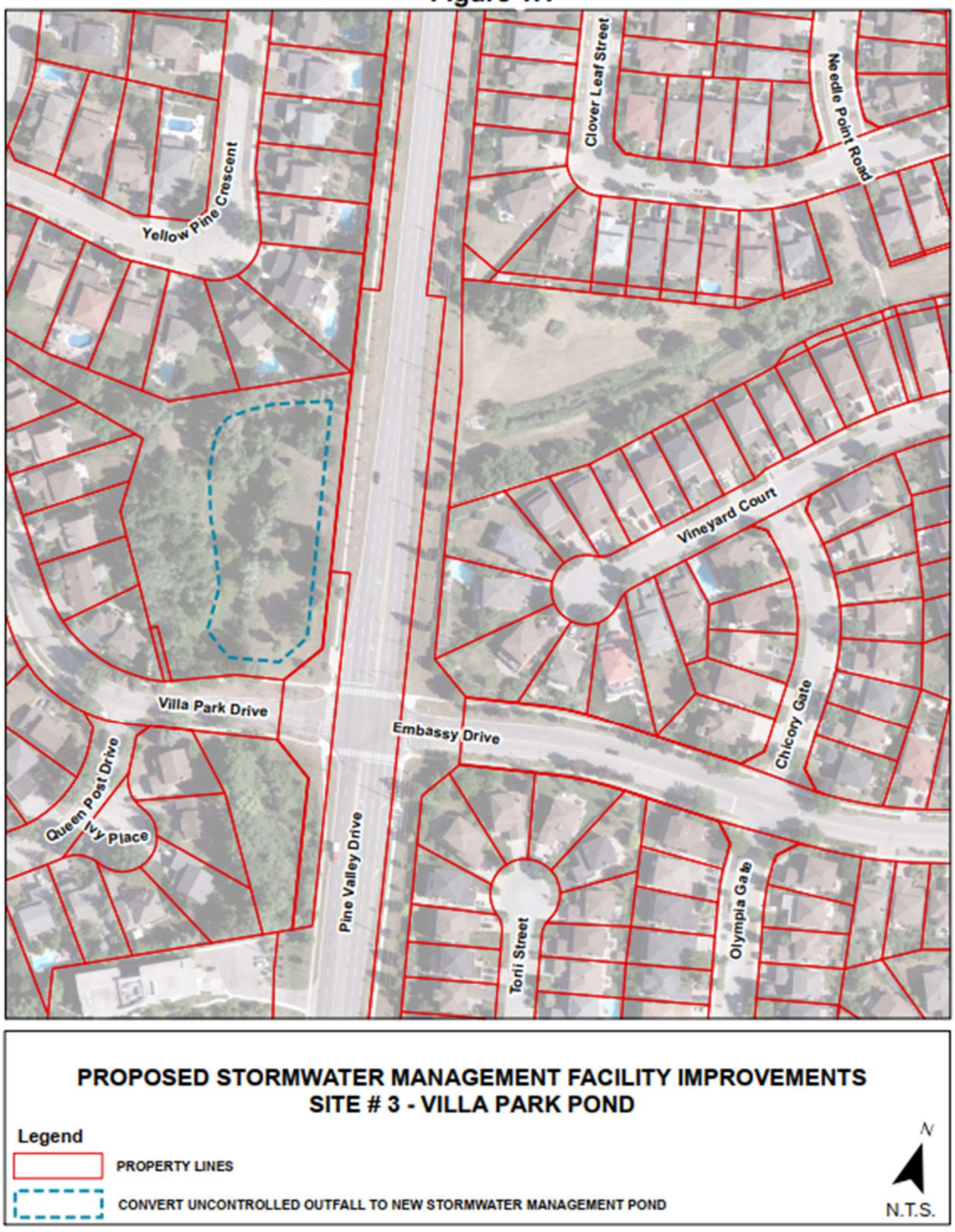


Figure 1.1: Site Location Map

This Class Environmental Assessment document reflects the following five key principles of successful planning under the Environmental Assessment Act.

- Consultation with affected parties early on, such that the planning process is a cooperative venture.
- Consideration of a reasonable range of alternatives.
- Identification and consideration of the effects of each alternative on all aspects of the environment.
- Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects.
- Provision of clear and complete documentation of the planning process followed, to allow "traceability" of decision-making with respect to the project.

The accompanying flow chart (**Figure 1.2**) illustrates the process followed in the planning and design of projects covered by this Class Environmental Assessment. The five phases, as defined in the flow chart, are summarized in the document as follows:

Phase 1: Identify the problem or deficiency.

Phase 2: Identify alternative solutions to the problem, by taking into consideration the existing environment, and establish the preferred solution taking into account public and agency review and input. At this point, identify approval requirements (e.g., Ontario Water Resources Act, Lakes and Rivers Improvement Act, and Environmental Protection Act) and determine the appropriate schedule for the project and proceed through the appropriate phases (**Figure 1.2**).

Phase 3: Examine alternative methods of implementing the preferred solution, based upon the existing environment, public and government agency input, anticipated environmental effects, and methods of minimizing negative effects and maximizing positive effects.

Phase 4: Document, in an Environmental Study Report, a summary of the rationale and the planning, design, and consultation process of the project as established throughout the above phases, and make such documentation available for scrutiny by review agencies and the public.

Phase 5: Complete contract drawings and documents, and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities.

Public and agency consultation is also an important and necessary component of the five phases.

The Municipal Engineers Association's Class EA document classifies projects as Schedule A, B or C depending on their level of environmental impact and public concern.

- **Schedule 'A'** projects are generally routine maintenance and upgrade projects; they do not have big environmental impacts or need public input. Schedule 'A' projects are all so routine that they are generally pre-approved without any further public consultation.

- **Schedule 'B'** projects have more environmental impact and do have public implications. Examples would be stormwater ponds, river crossings, expansion of water or sewage plants beyond up to their rated capacity, new or expanded outfalls and intakes, and the like. Schedule 'B' projects require completion of Phases 1 and 2 of the Class EA process.

- **Schedule 'C'** projects have the most major public and environmental impacts. Examples would be storage tanks and tunnels with disinfection, anything involving chemical treatment, or expansion beyond a water or sewage plant's rated capacity. Schedule 'C' projects require completion of Phases 1 through 4 of the Class EA process, before proceeding to Phase 5 implementation.

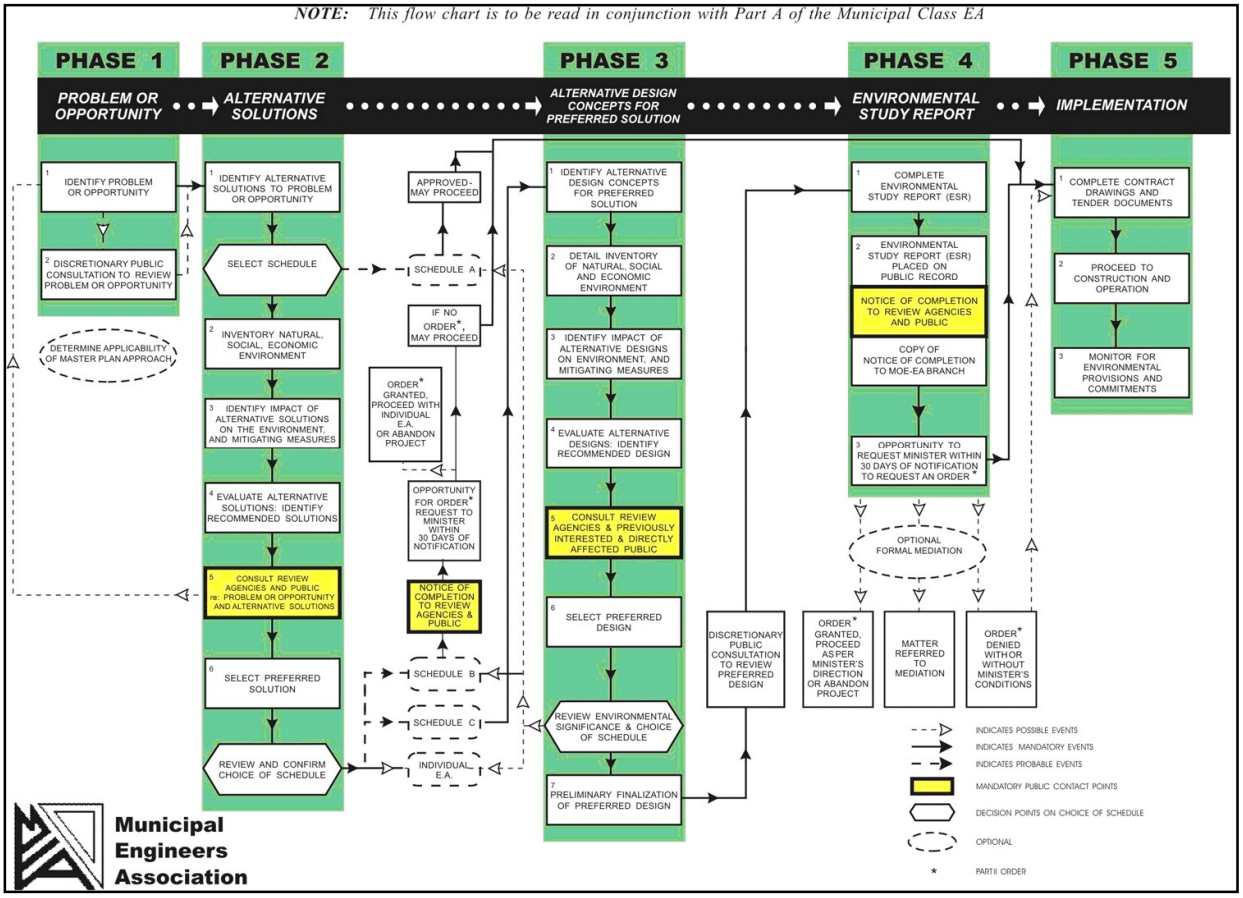


Figure 1.2: Municipal Class Environmental Assessment Planning and Design Process

The current study has been classified by the City as a Schedule B project and follows Phases 1 and 2 of the planning and design process with Phase 5 to follow at a subsequent stage. This report outlines Phases 1 and 2 of the EA process.

1.3 Study Area Characteristics

The primary study area is the Villa Park Pond, located west of Pine Valley Drive and north of Villa Park Drive in the community of Woodbridge, Vaughan. The ultimate area has been expanded to include the adjacent Jersey Creek, tributary to the East Humber River, ensuring that all items relating to social, environmental, transportation and economic environments are addressed. The general study area is illustrated in **Figure 1.1**.

Land use in the proximity of the pond and watercourse includes residential single-family homes.

1.4 Study Purpose and Primary Tasks

The study purpose has been defined as follows:

> To identify and evaluate the alternative solutions to permit the retrofit of the Villa Park Pond and restoration to the channel of the adjacent Jersey Creek.

The primary tasks which were undertaken as part of this study and the associated chapters in which information is provided are summarized below:

Chapter 1 – Define the study purpose
Chapter 2 – Define the problems and opportunities associated with the study
Chapter 3 – Establish existing environmental and social conditions
Chapter 4 – Present and evaluate the alternative solutions
Chapter 5 – Present and select the preferred alternative
Chapter 6 – Provide conclusions and recommendations

2 PROBLEM AND OPPORTUNITY IDENTIFICATION

2.1 General

Phase 1 of the municipal Class Environmental Assessment process involves identification of the problem to be resolved together with the opportunities to resolve the problem. Provided below is a summary of the problem(s) and opportunity(ies).

2.2 Identification of Problems and Opportunities

Constructed prior to the implementation of modern stormwater management planning, the Villa Park Pond, which is located in Woodbridge, Vaughan was originally constructed as a dry pond facility discharging runoff untreated for water quality into the receiving Jersey Creek watercourse. The City of Vaughan has initiated the design phase for this project under funding from the federal Disaster Mitigation Adaption Fund (DMAF), and ultimately intends to tender the project for construction along with other sites that received similar funding. Prior to the commencement of work, this Class EA will identify and evaluate the alternative solutions to permit the retrofit of the Villa Park Pond and the restoration of the downstream channel of Jersey Creek.

Completing these options will require making potential arrangements, including consultation and permitting with approval agencies.

3 EXISTING CONDITIONS

3.1 Study Area

The existing facility is located adjacent to the tributary of the East Humber River known as Jersey Creek. The facility is bounded by Pine Valley Drive to the east, Villa Park Drive to the south, existing residential properties to the west, and channel forming Jersey Creek to the west and north. Jersey Creek flows from northwest to southeast across the site, and the existing storm outfall for the creek and facility is located at the east end of the site, adjacent to Pine Valley Drive.

3.2 Natural Environment

3.2.1 General

This section will describe the natural environment within and adjacent to the study area. The objective of the following sections is to describe the natural (as well as social and economic) environment from a study area perspective.

3.2.2 Geology, Physiography and Soils

The study area is located in the lower reaches of the East Humber subwatershed, bordering on the Lower Humber subwatershed, which lies in the Peel Plain physiographic region of southern Ontario. The Peel Plain extends from the Medad Valley in the southwest to Reesor Creek in the northeast. This former lake bottom is characterized by bedrock comprised of shale of the Georgian Bay Formation Shale, overburdened with flat, silty clay. The Lower Humber River carries water off the Peel Plain through the Iroquois Sand Plain to Lake Ontario.

Soils within the study area consist of fine-textured glaciolacustrine deposits, characterized by silt and clay, minor sand and gravel (Ontario Geological Survey, 2003). The soils are further described as being interbedded silt and clay and gritty, pebbly flow till and rainout deposits. The clay soils of the Peel Plain have a low infiltrative capacity and lower recharge rates. A larger portion of precipitation becomes surface runoff under natural conditions (TRCA, 2008).

3.2.3 Terrestrial Communities

An Environmental Impact Statement was completed by Aquafor Beech in 2022 for the study area. A copy of the report can be found in Appendix B. The information contained in this section provides a summary of the 2022 Aquafor Beech Report. For further details, the original report should be used as a comprehensive resource. **Figure 3.1**: illustrates the study area used for the Environmental Impact Assessment, and the limits of ecological land classification for vegetation communities.

Figure 3.1: Ecological Land Classification Vegetation Communities

The Villa Park Pond (Site 3) study area is mainly parkland with open field and scattered mature trees (likely planted as part of the park landscaping). The western portion of the study area is sloped woodland ranging from lowland to upland composition. The tributary of the East Humber River runs centrally through the study area from north to south, with a narrow, treed riparian buffer.

Vegetation communities were assessed according to the Ecological Land Classification (ELC) for Southern Ontario, First Approximation (Lee et al., 1998). Where a suitable community description was not available per the First Approximation, classification was supplemented from the 2008 Draft version for Southern ELC (most equivalent 1998 code is provided in brackets where this applies). The following three community types were documented on the site (as illustrated on **Figure 3.1**):

MEGM3-4: Kentucky Blue Grass Graminoid Meadow Type - This community encompasses the unmown open area associated with the parkland east of creek, which is intended to provide a naturalized area for local pollinators. Species observed here are mainly graminoid, predominantly Kentucky Bluegrass. Other common cultural meadow forbs and graminoids are common throughout, particularly along the creek riparian area. These include Canada Goldenrod, Common Teasel (*Dipsacus fullonum*), Red Clover, Hedge Bedstraw, Bull Thistle (*Cirsium vulgare*), Orchard Grass (*Dactylus glomerata*), Avens, Wild Parsnip (*Pastinaca sativa*), Wild Carrot

(*Daucus carota*), Common Dandelion (*Taraxacum officinale*), Common Evening Primrose (*Oenothera biennis*), Common Mullien (*Verbascum thapsus*), Annual Fleabane (*Erigeron annuus*) Curly Dock (*Rumex Crispis*), Garlic Mustard, Mountain Bluet (*Centaurea montana)* Yellow Rocketcress (*Barbarea vulgaris*), Violet (*Viola* sp.), Virginia Waterleaf (*Hydrophyllum virginiana*), New England Aster (*Symphyotrichum nova-anglai*) and Riverbank Grape. The watercourse edges featured Celery-leaved Buttercup (*Ranunculus sceleratus*), Spotted Jewelweed, Tall Buttercup, Reed Canary Grass and Watercress (*Nasturteum officinale*) and Planted trees such as Sugar Maple, Walnut, Catalpa (*Catalpa* sp.), White Spruce (*Picea glauca*), Norway Spruce (*Picea abies*) and Blue Spruces and Red Pine (*Pinus resinosa*) are scattered throughout. A narrow strip of riparian woody vegetation borders the creek including Willows, Manitoba Maple, Sugar Maple, Basswood, Silver Maple (*Acer saccharinum*), Ash, European Buckthorn, White Mulberry and Basswood.

FOD5-3: Dry – Fresh Sugar Maple and Oak Deciduous Forest - This community exists along the slope between the open parkland and the residential area to the west of the study area. Upland hardwoods characterize this community, with mid-aged Sugar Maple as the dominant, and occasional medium to large Oaks (Red and White – *Quercus alba* and *Q. rubra*) throughout. Hardwood associates such as Black Cherry (*Prunus serotina*) and Basswood were also present. The subcanopy was almost exclusively Sugar Maple, although Ironwood (*Ostrya virginiana*) were common. The shrub layer was relatively sparse, but contained young Sugar Maple, Chokecherry, young Ash, European Buckthorn and Prickly Gooseberry (*Ribes cynosbati*). The ground layer contained a high content of Winter Creeper (*Euonymus fortunei*) and Garlic Mustard, but was also relatively sparse. It is not unlikely that spring ephemerals may be present in this community in spring.

FOD7-7: Fresh – Moist Manitoba Maple Lowland Deciduous Forest - This community is located in the western extent of the study area at the toe of slope between the residential land west of the park and the creek. Manitoba Maple is the dominant species in the canopy and subcanopy, followed by Black Walnut and Green Ash (*Fraxinus pennsylvanica*), the majority of which showed signs of Emerald Ash Borer infestation. Willow and Trembling Aspen (*Populus tremuloides*) were also noted in low abundance in the subcanopy. The shrub layer contained an abundance of young Ash and European Buckthorn. Chokecherry, Red-osier Dogwood, Black and Red Raspberries (*Rubus occidentalis* and *R. idaeus*), and Winged Euonymus (*Euonymus alatus*) were also present. The ground layer was variable dependant on canopy cover, but contained a variety of disturbance tolerant species common to lowland communities, such as Winter Creeper, Canada Goldenrod, Panicled Aster, Reed-canary Grass, Colt's Foot (*Tussilago farfara*), Bedstraw (*Galium* sp.), Garlic Mustard, Fringed Loosestrife (*Lysimachia ciliata*) and Water Hemlock (*Cicuta* sp.). Several wet patches were present throughout the community, which often featured lower canopy cover than the surroundings and a high occurrence of Red-osier Dogwood as the dominant in these areas.

Anthropogenic areas are also found within the study area, which includes roads, lawns and residential lots.

Tree Inventory

A tree inventory was undertaken in 2021 to identify trees ≥10 cm diameter at breast height (DBH) that may be affected by the proposed works. Trees with features that could provide wildlife habitat, particularly habitat for Species at Risk (SAR) bats, were also documented at this time. Please note that only the area where activities are proposed were surveyed. Each individual tree was given an overall status of poor, fair, or good based on its structural and biological condition. The locations of inventoried trees are mapped on **Figure 3.2**.

Overall, a total of 245 trees were inventoried, which included 24 species (seven non-native and 17 native) (**Figure 3.3**). An additional three were identified to genus level only. By abundance, there were significantly more native trees (173) inventoried than non-native (68), with Manitoba Maple being the most abundant followed by Black Walnut. Manitoba Maple is a generalist species which tends to dominate highly disturbed forests and woodlands and Black Walnut tends to be a lowland species with a high tolerance to disturbance.

Of the 245 trees inventoried, 157 are to be removed and an additional eight are to be impacted according to the current proposed design. The location of each tree and their removal status is depicted on **Figure 3.2**. The City of Vaughan regulates the impact and removal of trees within the city limits under By-law 052-2018 Tree Protection By-law. As stated in Section 2.0 (b) of this by-law, trees impacted or removed as a part of a municipal project are not subject to this by-law. Trees that are to be injured or retained must be protected following the City's Tree Protection Protocol (2018).

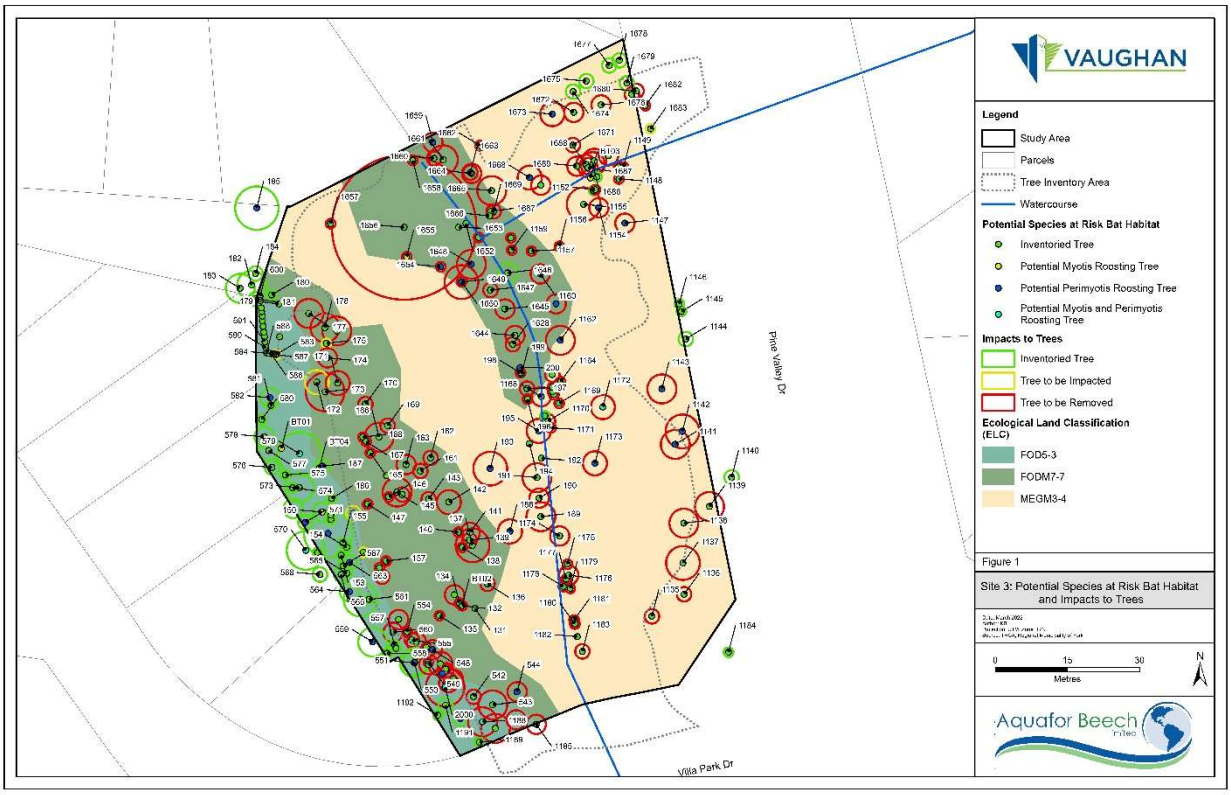


Figure 3.2: Impacts to Trees (Including Potential SAR Bat Habitat)

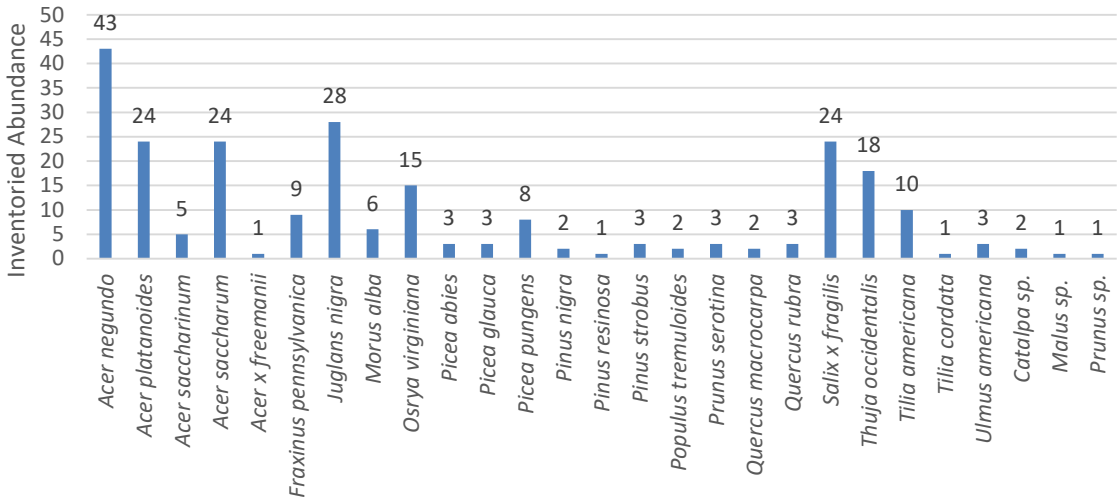


Figure 3.3: Inventoried Tree Abundance

Terrestrial Wildlife

Due to the degree of development/disturbance associated with Site 3, and the limited nature of natural habitat, targeted wildlife surveys at this location were not included in the scope of work for this assignment. Instead, a general reconnaissance field review was completed as a due-diligence measure to confirm a lack of significant or noteworthy habitat features in the affected study area, in addition to a review of background information sources and mapping. This assessment confirmed that the site consisted mainly of maintained parkland with a narrow strip of vegetation along the watercourse and relatively small, isolated patches of woodland along the margins. A low number of very common species such as American Robin (*Turdus migratorius*), Common Racoon (*Procyon lotor*), Eastern Cottontail (*Sylvilagus floridanus*), and Eastern Gray Squirrel (*Sciurus carolinensis*) were observed while on site. Background resources (including community science observation records) also provided very few observations for the general vicinity of the study area, and these consisted of common, widespread species for suburban areas. No SAR or Species of Conservation Concern (SOCC) were observed incidentally by Aquafor.

Air photo review indicates that the site is fairly isolated by development. There is some potential connectivity with additional habitat to the south via the stream corridor, although this corridor is broken by several roads and a developed property (retirement home). Habitat to the north appears to consist almost entirely of maintained/mown properties; therefore, while the subject property likely contributes to the overall habitat in the area, it is not considered to be a vital link or significant terrestrial corridor between habitats up- and downstream.

3.2.4 Aquatic Communities

In general, the study area within the tributary to the East Humber River (Jersey Creek) shared characteristics with an urban-adaptive watercourse, with signs of past engineering and infrastructure influences observed throughout. The watercourse has been altered through active interference and engineeering as well as through passive effects related to urbanization. Signs of infrastructure and engineering was evident throughout, with the watercourse extending through sewer pipes and under major roadways and major transportation infrastructure. While the site did not observe significant fish barriers resulting from these anthropogenic interferences, much of the tributary appears to be channelized and confined to sewers upstream of the confluence with the East Humber River. This suggests that habitat fragmentation within the tributary could be an overall influence on habitat and species composition. Upstream of Villa Park Drive, the watercourse displays little naturalized characteristics, contributed largely by channelized reaches bound by little to no riparian habitat.

The Fisheries Management Plan mapping details that the study area represents intermediate riverine fish habitat for warmwater species, stating that, “overall, this habitat category continues to sustain a relatively diverse aquatic community with fewer species than what was found historically. While this habitat is still able to support sensitive species such as darters, the lack of specialized feeders and piscivores indicates some degradation. As such, management for sensitive species and piscivores will also ensure the survival of the more tolerant fish species” (MNRF &

TRCA, 2004). A list of presently found species within this type of habitat, as well as their characteristics, is shown in **Table 3.1**.

Table 3.1 - Fisheries Management Plan Species List for Intermediate Riverine Warmwater Habitat

Common Name	Scientific Name	Tolerance	Thermal Regime	Spawning Months
Blacknose Dace	*Rhinichthys atratulus*	Intermediate	Coolwater	May - June
Longnose Dace	*Rhinichthys cataractae*	Intermediate	Coolwater	May - July
White Sucker	*Catostomus commersonii*	Tolerant	Coolwater	April - June
Creek Chub	*Semotilus atromaculatus*	Intermediate	Coolwater	May - June
Fathead Minnow	*Pimephales promelas*	Tolerant	Warmwater	May - August
Golden Shiner	*Notemigonus crysoleucas*	Intermediate	Coolwater	June - August
Brown Bullhead	*Ameiurus nebulosus*	Intermediate	Warmwater	May - June
Northern Redbelly Dace	*Phoxinus eos*	Intermediate	Coolwater	May - July
Northern Hog Sucker	*Hypentelium nigricans*	Intermediate	Warmwater	April - May
Redside Dace *	*Clinostomus elongatus*	Intolerant	Coolwater	May - June
Common Shiner	*Luxilus cornutus*	Intermediate	Coolwater	May - June
Spottail Shiner	*Notropis hudsonius*	Intermediate	Coolwater	May - June
Bluntnose Minnow	*Pimephales notatus*	Intermediate	Warmwater	June - August
Central Stoneroller	*Campostoma anomalum*	Intermediate	Coolwater	May - June
Rock Bass	*Ambloplites rupestris*	Intermediate	Coolwater	May - June
Pumpkinseed	*Lepomis gibbosus*	Intermediate	Warmwater	May - August
Largemouth Bass	*Micropterus salmoides*	Tolerant	Warmwater	May - June
Yellow Perch	*Perca flavescens*	Interediate	Coolwater	April - May
Rainbow Darter	*Etheostoma caeruleum*	Intolerant	Coolwater	April - June
Fantail Darter	*Etheostoma flabellare*	Intolerant	Coolwater	May - June
Johnny Darter	*Etheostoma nigrum*	Tolerant	Coolwater	May - June

* Nationally and provincially Endangered

It should be noted that this information is provided as a general list for the type of habitat observed within the Humber River watershed and does not represent an exact species within the study area watercourse. For example, the above table suggests that Redside dace, a provincially and federally listed Species at Risk is found within this type of habitat, however there are no records showing that the species is or has been historically found within the tributary to the East Humber River. This is supported by Fisheries and Oceans Canada Species at Risk mapping where no species at risk are found (or potentially found) as well as no critical habitat for these species, is found within the study areas. While evidence provided in the Fisheries Management Plan suggest that the

tributary to the East Humber River provides habitat to a variety of fish species, the habitat present within the immediate study area upstream of Villa Park Drive is highly fragmented and of low quality, suggesting that this extensive species list is not supported by the habitat found at the study site.

3.2.5 Species at Risk Screening

For the purposes of this assignment, Species at Risk (SAR) are those which have designated endangered, threatened, or special concern by the provincial Endangered Species Act and/or the federal Species at Risk Act. Aquafor consulted all available background information sources to determine the potential occurrence of SAR within or in the vicinity of the study area, and contacted the Ontario Ministry of the Environment, Conservation, and Parks (MECP) to solicit their input on species to be included in the screening. The compiled list of species was then screened for the potential to currently occur in the study area by cross-referencing the species' habitat requirements with the habitat conditions present within the study area and adjacent lands.

The Site 3 study area was determined to contain potential habitat for one or more of Ontario's SAR bat species. As this potential habitat is expected to be impacted by proposed tree removals on the site, an Information Gathering Form (IGF) will be required to be submitted to the MECP to solicit their input on the regulatory requirements for the project under the Endangered Species Act.

No other SAR were determined to potentially be impacted by the proposed works at this location.

3.3 Socio-Economic Environment

The area surrounding the existing Villa Park Pond facility is a residential neighborhood within the community of Woodbridge. Single-family residential properties abut the western and northern limit of the study area. Pine Valley Drive bounds the facility to the east, with a continuation of the residential neighborhood along Embassy Drive. A retirement home facility lies to the south. Farther south are commercial properties leading into the Highway 7 Business Improvement Area.

3.3.1 Land Use

According to the City of Vaughan zoning mapping, the land use for the SWM facility is zoned as "Open Space". The surrounding area is highlighted as "Residential", with additional "Open Space" zoning to the south of the retirement facility. Farther south, along the Highway 7 corridor, zoning is denoted as "Commercial".

3.3.2 Proposed Land Use

The proposed design for the Villa Park Pond includes a retrofit of the existing dry pond facility. Therefore, no changes to the overall land use within the study area.

3.3.3 Transportation

Pine Valley Drive is a major north-south arterial that extends through the area in Vaughan, and includes ramp access to Highway 407 to the south of the study area. Therefore, it acts as a significant access point for the surrounding residential neighborhood. Villa Park Drive is a smaller residential road that provides connectivity for the residential neighborhood bounding the west side of Pine Valley Drive. Farther south of Villa Park Drive lies the Highway 7 corridor, where Pine Valley Drive intersects with Highway 7. This is an established business area for the commercial development surrounding Highway 7.

3.3.4 Natural Hazards

Figure 3.4 illustrates the floodplain spill screening area (blue) and Toronto and Region Conservation Authority (TRCA) Generic Regulated Area (green) for the Jersey Creek within the area surrounding the study limits. As noted within the figure, the floodplain lines are contained within the zoned open space, with some encroachment on the rear yards of the adjacent residential properties. The generic regulated area, which represents an extent based on the worst of the flood line, stable top of bank, meander belt or wetland together with associated setbacks extends well within the limits of the adjacent properties, especially to the north.

Figure 3.4: Flooding and Regulation Limits (Source: TRCA's Online Regulation Mapping Tool. Accessed March 10, 2022)

4 ASSESSMENT AND EVALUATION OF ALTERNATIVES

The overall objective of this Class EA is to select a preferred design alternative for the stormwater management retrofit of Villa Park Pond and the restoration of the connecting Jersey Creek channel with the goal of improving overall water quality. Additional objectives include the improvement/restoration of local aquatic and terrestrial habitat, improvement of baseflow and instream temperature regimes, the improvement of future operations and maintenance activities and the retrofit of existing concrete channels so as to represent a more natural stream channel design.

4.1 General

This chapter:

- Provides a general description of the types of alternative solutions that were considered in order to assess the problems and opportunities as defined in Section 2.2 and meet the study purpose as defined in Section 1.4; and
- Provides an evaluation of the effectiveness of the alternative solutions.

4.2 Generalized Approach for Categorizing Alternatives

Section 1.4 defined the study purpose as follows:

> "To identify and evaluate the alternative solutions to permit the retrofit of the Villa Park Pond and restoration to the channel of the adjacent Jersey Creek."

In a simplified sense, the alternative solutions must collectively address issues relating to both the retrofitting of the Villa Park Pond as well as the channel restoration of Jersey Creek.

A description of the alternative solutions that were considered for this study are provided in the following sections.

4.3 Assessment of Alternatives

Three alternatives to implement the pond retrofitting and channel restoration work were considered in this study. The alternatives include:

1. Do Nothing

2. Off-Line Stormwater Management Wet Pond Facility and Creek Naturalization
3. On-Line Stormwater Management Wet Pond Facility

4.3.1 Alternative #1 – Do Nothing

This alternative is traditionally carried forward as a benchmark in the Environmental Assessment process. For the purpose of this study the "Do-Nothing" alternative would essentially equate to maintaining the existing Villa Park Pond facility as a dry pond. The facility would continue to receive runoff from the north inlet (29 hectare contributing area) as well as the northeast inlet (205 hectare area). **Figure 4.1** illustrates the location of the existing stormwater facility under current conditions.

This alternative is expected to have no capital costs associated with it.

4.3.2 Alternative #2– Off-Line Stormwater Management Wet Pond Facility and Creek Naturalization

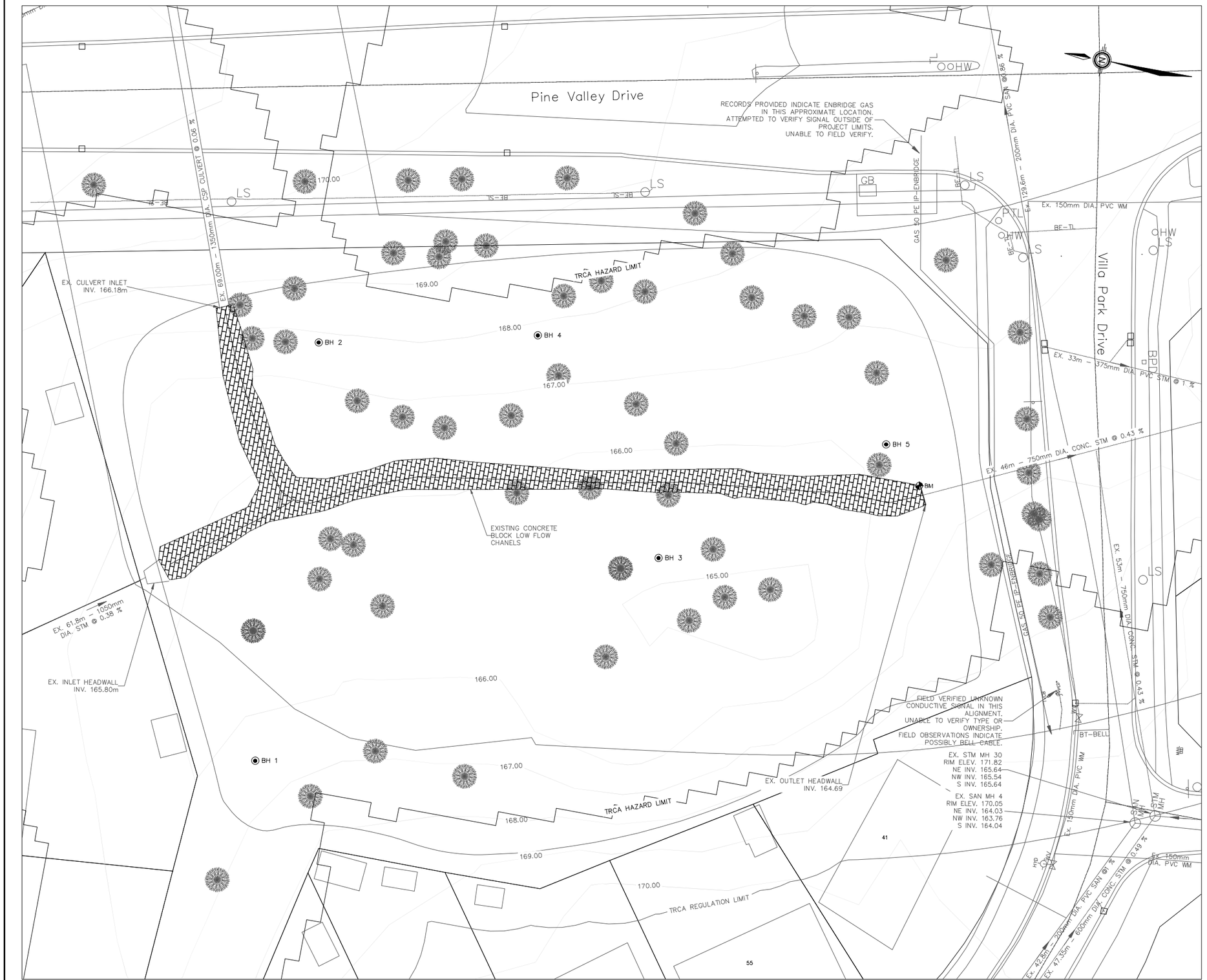
This alternative involves upgrading the existing Villa Park Pond to include the design of a wet pond with a separation berm installed between the proposed pond and the adjacent creek channel to disconnect inflows from the northeast inlet. The pond would therefore remain off-line, with contributing flows from the north inlet receiving water quality benefits.

The proposed wet pond will be constructed with a new forebay designed to remove suspended sediment and a permanent pool storage volume to provide continued pollutant removal, as well as temperature control. Extended detention volume will also be provided above the permanent pool depth within the new wet pond to provide downstream erosion control. SWM Shield structures are proposed at the pond inlet to provide additional sediment removal benefits to water quality.

The existing channel will be restored to a naturalized condition, providing a riffle-pool sequence within the stream bed and vegetated buttresses along the banks of the outer bends to promote natural form for the creek. Realignment of the existing creek will be required to implement this. The current grade of the existing channel bed has been maintained to connect the upstream northeast inlet to the outlet at the south end of the channel. An average channel width of 7.5 m will also be maintained, allowing a bank full discharge approximately equivalent to the 2-year flood.

Figure 4.2 illustrates the proposed off-line stormwater management facility configured with the naturalized creek realignment.

This alternative is estimated to have a capital cost of $3,200,000.00, which includes a 25% allowance for engineering and design and construction contingency.



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DIRECTOR OF INFRASTRUCTURE DELIVERY

DATE

SCALE

HORIZONTAL: 0 10 20 40

VILLA PARK POND

EXISTING CONDITIONS - OPTION 1

VAUGHAN
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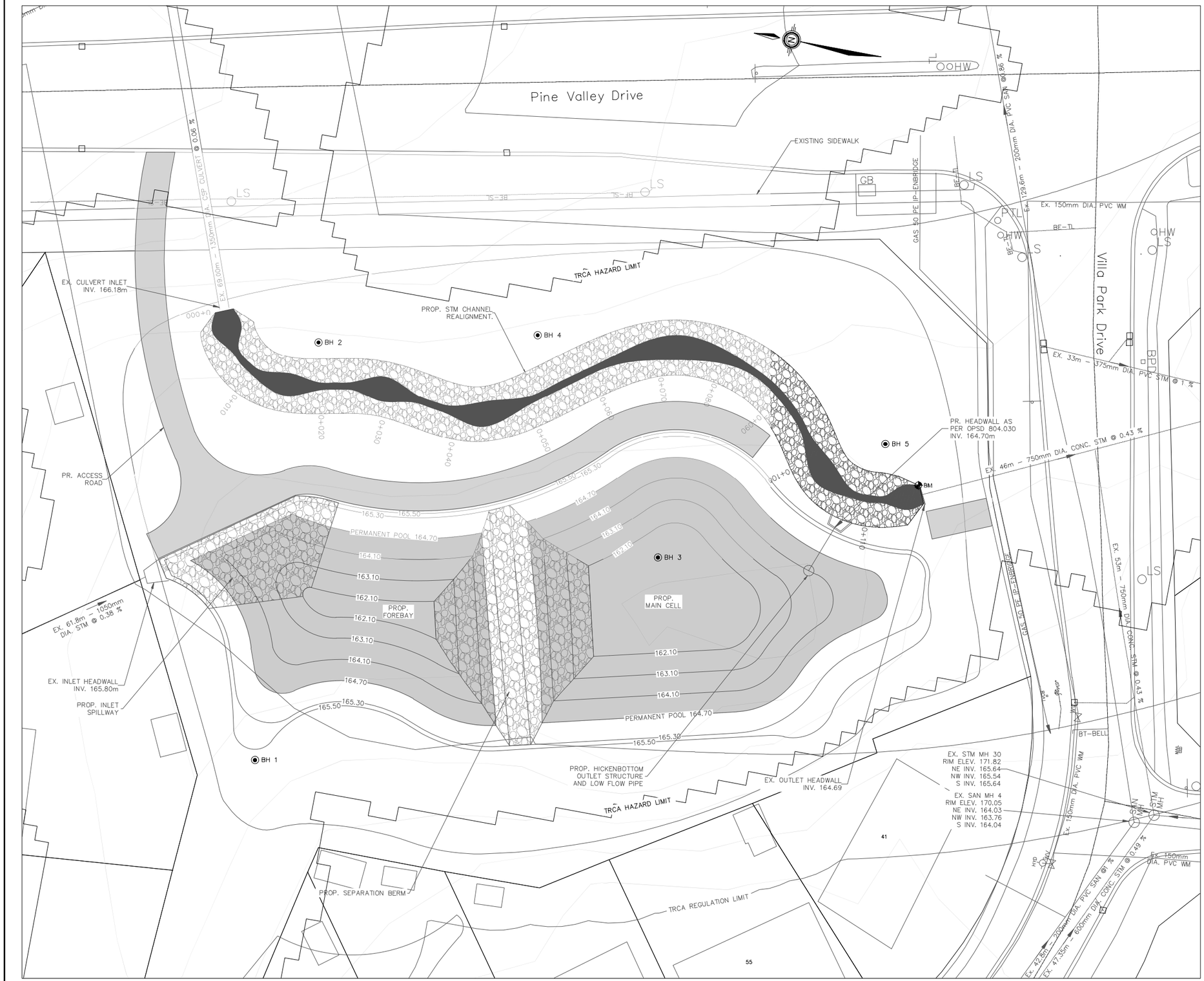

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SCALE: HORIZONTAL: 0 10 20 40

VILLA PARK POND

PROPOSED CONDITIONS - ALTERNATIVE 2
OFFLINE FACILITY AND CREEK REALIGNMENT

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Infrastructure Delivery

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SCALE: N.T.S	PROJ. No.	DWG. No. 4.2

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4.3.3 Alternative #3 – On-Line Stormwater Management Wet Pond Facility

This alternative involves upgrading the existing Villa Park Pond to include the design of a wet pond where the existing channel will be allowed to flow through the facility. **Figure 4.3** illustrates this configuration. The pond would therefore remain on-line, with contributing flows from both the north and northeast outlets continuing to contribute to the facility.

The proposed wet pond will also be constructed with a new forebay and permanent pool to provide sediment and pollutant removal, as well as temperature control. Extended detention volume will also be provided above the permanent pool depth within the new wet pond to provide downstream erosion control. SWM Shield structures would be installed at both pond inlets to provide additional sediment removal benefits to water quality.

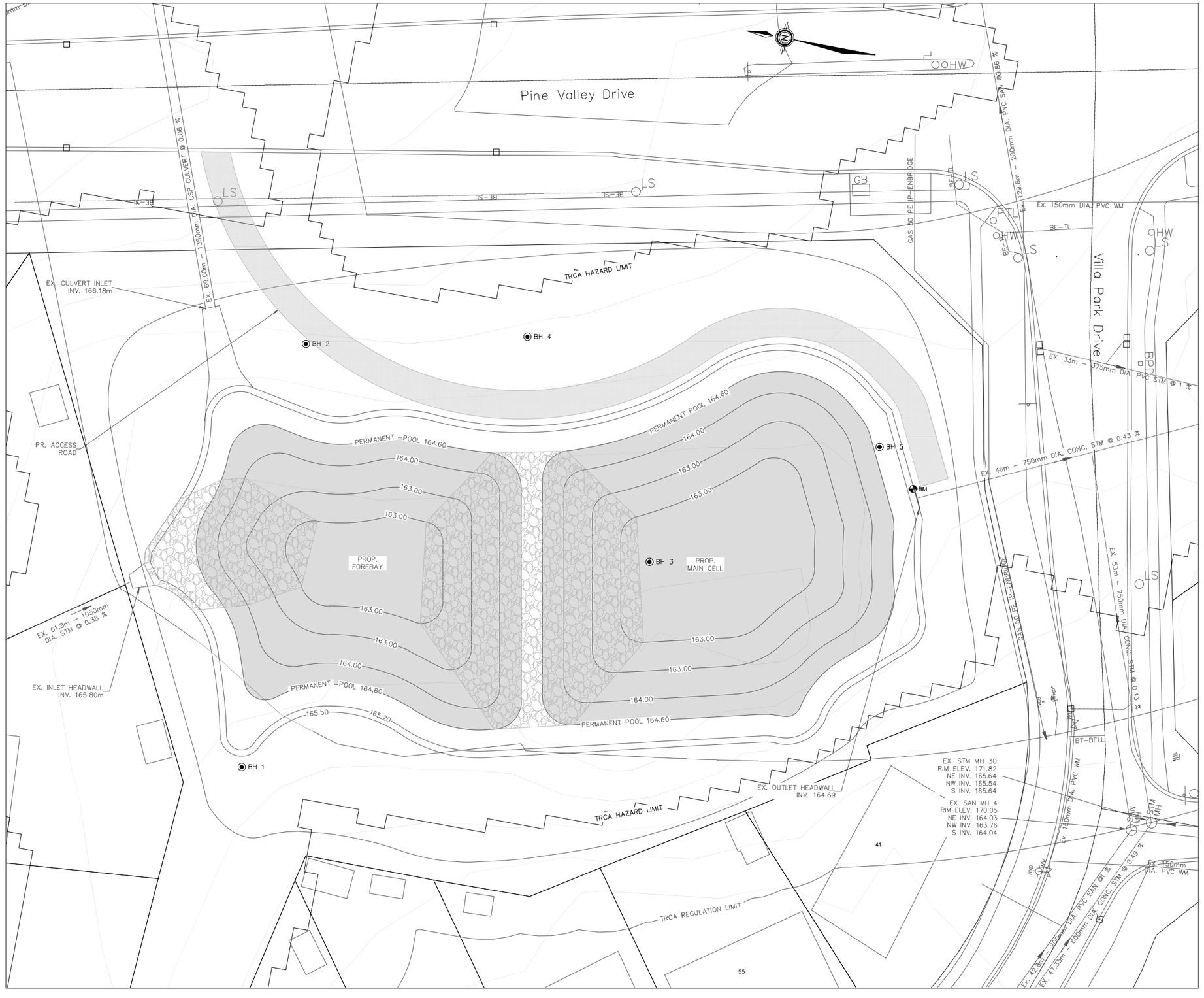
This alternative is estimated to have a capital cost of $4,300,000.00, which includes a 25% allowance for engineering and design and construction contingency.

4.4 Evaluation Criteria

As part of the Municipal Class Environmental process, each alternative must be evaluated based on a set of Physical/Natural Environment criteria, Social/Cultural criteria and Economic criteria. Technical criteria have also been included as an additional category as part of this assessment. The set of criteria was developed by Aquafor Beech Limited and reviewed by the City. A summary of these criteria is provided in **Table 4.1**.

4.5 Evaluation of Alternatives

For each of the comparative criteria, a rating ranging from 1 to 4 was applied specific to the particular solution being evaluated, where 1 represents the worst condition and 4 represents the best condition for satisfying the criteria. **Tables 4.2, 4.3, 4.4**, and **4.5** provide further information with respect to description of the criteria and the method used in assigning a score to each criterion. Based on this approach, an overall rating based on the total scoring was obtained for each alternative solution. Subsequently, a ranking was assigned for each alternative solution, with the highest overall total score assigned 1 and the others sequentially, 2 and 3 based on their scoring. Where the total ratings are the same, the same ranking was assigned.



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JACK GRAZIOSI, P.Eng., M.Eng.
DIRECTOR OF INFRASTRUCTURE DELIVERY

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VILLA PARK POND

PROPOSED CONDITIONS - ALTERNATIVE 3
ONLINE FACILITY AND CREEK RECONSTRUCTION

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Table 4.1: Criteria used in Evaluation Process for selecting the Preferred Retrofit Options

Environmental Assessment Categories	Criteria
Physical/Natural Environment	• Potential Impact/Benefit on existing terrestrial systems (vegetation, trees, wildlife) • Potential Impact/Benefit on Aquatic Systems, Aquatic Life and Vegetation (Fish Passage) • Potential Impact/Benefit on Aquatic Systems, Aquatic Life, and Vegetation (Temperature) • Potential Water Quality Benefit • Potential to Reduce Downstream Erosion & Flooding
Social/ Cultural	• Potential to Provide Health Safety Objectives • Aesthetic/Recreation Benefits • Compatibility with Existing Land-use • Potential Community Disruption
Economic/Financial	• Capital Construction Costs • Operation/Maintenance Costs • Protection of New/Existing Infrastructure
Technical	• Ease of Implementation • Agency Acceptance • Meets Policy/By-law Requirements • Technical Feasibility • Ease of Maintenance

Table 4.2: Description of Physical/Natural Environment Criteria used in the Selection of the Preferred Alternative

Criteria	Description of Criteria	Measures for Assigning Scores
Potential Impact/Benefit on existing terrestrial systems	• Ability of alternative to improve/support existing vegetation, trees, wildlife	• Scoring ranges from 4 if the alternative has a high potential to 1 if there is limited potential
Potential Impact/Benefit on Aquatic Systems, Aquatic Life, and Vegetation (Fish Passage)	• Ability of alternative to improve aquatic habitat within the study area by eliminating fish barriers	• Scoring ranges from 4 if fish passage is well facilitated to 1 if fish passage is impeded/restricted
Potential Impact/Benefit on Aquatic Systems, Aquatic Life, and Vegetation (Temperature)	• Ability of alternative to improve aquatic habitat within the study area with respect to thermal regime	• Scoring ranges from 4 if the alternative has a high potential to improve thermal regime to 1 for a low potential to improve thermal regime
Potential Water Quality Benefit (sediment loading and contaminants)	• Ability of alternative to improve water quality for stormwater effluent	• Scoring ranges from 4 if water quality targets are met to 1 for limited improvement to water quality

Potential to Reduce Downstream Erosion & Flooding	• Ability of alternative to limit the effects of downstream erosion and flooding	• Scoring ranges from 4 if the alternative has a high potential to 1 if there is limited potential

Table 4.3: Description of Social/ Cultural Criteria used in the Selection of the Preferred Alternative

Criteria	Description of Criteria	Measures for Assigning Scores
Potential to Provide Health Safety Objectives	• Ability of alternative to limit risk to private property, roads, sidewalks, and public trails	• Scoring ranges from 4 if public health and safety risks are minimal to 1 if significant public health and safety risks exist or could exist
Aesthetic/Recreation Benefits	• Ability of alternative to act as an asset to the community by integrating the facility into existing site activities such as walking, jogging, biking, and hiking	• Scoring ranges from 4 if there is a good potential to integrate the facility into existing activities to 1 if there is minimal potential
Compatibility with Land-Use	• Ability of alternative to retrofit within the existing land designated for the facility, limiting impacts to adjacent residential land-use. Access/egress also needs to be considered	• Scoring ranges from 4 if there are no impacts associated with adjacent land-use and access/egress to 1 if impacts associated with adjacent land-use and access/egress are anticipated
Potential Community Disruption	• The potential of the alternative to disrupt the community during or after the construction process	• Scoring ranges from 4 if the proposed work is not disruptive to private property, local traffic, recreation activities, etc., to 1 if the proposed works are disruptive

Table 4.4: Description of Economic/Financial Criteria used in the Selection of the Preferred Alternative

Criteria	Description of Criteria	Measures for Assigning Scores
Capital Construction Costs	• The relative cost of retrofitting the pond/channel based on factors such as location, construction access, and area to dispose of excavated materials	• Scoring ranges from 4 if the relative cost based on identified factors is low to 1 if the relative cost is high
Operation/Maintenance Costs	• The relative cost of monitoring and maintaining the new pond and channel corridor based on factors such as access/ egress, maintenance activities (sediment drying), ownership implications, future risks due to failures or flooding, and overall operation frequency and intensity	• Scoring ranges from 4 if the relative cost based on identified factors is low to 1 if the relative cost is high
Protection of New/Existing Infrastructure	• Potential to protect existing or proposed infrastructure including storm sewers and outfalls, gabions, armour stone, fences	• Scoring ranges from 4 if the alternative protects existing/proposed infrastructure to 1 if existing/proposed infrastructure is left unprotected

Table 4.5: Description of Technical Considerations Criteria used in the Selection of the Preferred Alternative

Criteria	Description of Criteria	Measures for Assigning Scores
Ease of Implementation	• The ability of the alternative to be implemented taking into consideration approvals, homeowner acceptance, and length of time to implement	• Scoring ranges from 4 if the alternative can be implemented easily to 1 if implementation will be difficult
Agency Acceptance	• The willingness of representative agencies (City of Vaughan, TRCA, DFO, MNRF) to accept the alternative	• Scoring ranges from 4 if the alternative is most acceptable for agency approval to 1 if the alternative is least acceptable for agency approval
Meets Policy/By-law Requirements	• Ability/ease of the alternative to meet applicable policy/by-law requirements	• Scoring ranges from 4 if the alternative does not require implementation of special policies/bylaw to 1 if considerable policy/bylaw preparation is required.
Technical Feasibility	• The alternative is practical and can be feasibly implemented	• Scoring ranges from 4 if the alternative is feasible to 1 if it is not feasible
Ease of Maintenance	• The ability of the alternative to provide a manageable maintenance program	• Scores range from 4 if the maintenance program is easily implemented to 1 if the maintenance program will be complicated

Table 4.6 summarizes the ranking of each of the 3 alternatives based on the selected criteria in a detailed evaluation matrix.

Table 4.6: Detailed Evaluation Matrix

Evaluation Criteria	ALTERNATIVE #1	ALTERNATIVE #2	ALTERNATIVE #3
Physical/Natural Environment			
Potential Impact/Benefit on Existing Terrestrial Systems	2	4	3
Potential Aquatic Habitat Impact/Benefit (Fish Passage)	1	3	1
Potential Aquatic Habitat Impact/ Benefit (Temperature)	1	3	1
Potential Water Quality Benefit	1	4	1
Potential to Reduce Downstream Flooding and Erosion	1	4	4
Social/Cultural Environment			
Potential to Provide Public Health and Safety Objectives	4	3	1
Aesthetic / Recreation Benefits	1	4	1
Compatibility with Adjacent Land Use	4	4	1
Potential Community Disruption	4	3	1
Economic Environment			
Capital Construction Costs	4	2	1
Operation/Maintenance Costs	4	2	1
Protection of New/Existing Infrastructure	2	4	1
Technical/Engineering Considerations			
Ease of Implementation	4	3	1
Agency Acceptance	1	4	1
Meets Policy/Bylaw Requirements	1	4	2
Technical Feasibility	4	3	3
Ease of Maintenance	4	1	1
Total Score	**43**	**55**	**24**

4 = indicated that the retrofit design alternative score high in satisfying the respective design criteria
1 = indicated the retrofit design option scored low in relation to the criteria

4.5.1 Physical/Natural Environment

Potential Benefit on Existing Terrestrial Systems

A score of 2 was given to Alternative 1 as the existing environment is considered to be non-supportive of existing wildlife and vegetation; maintaining the existing conditions will provide a limited benefit. However, maintaining existing conditions will ensure that existing trees are not impacted.

A score of 4 was given to Alternative 2 as this option will enhance the naturalization of the existing channel, encouraging a supportive environment for terrestrial wildlife and vegetation. Although existing trees may be impacted under this alternative, new plantings as part of the proposed work will offset the negative consequences of existing tree removal, while additionally providing enhanced diversification.

A score of 3 was given to Alternative 3 as this option will also enhance naturalization of the site, however, a much larger area will need to be used to accommodate this design, and therefore more existing trees are expected to be impacted than in Alternative 2.

Potential Aquatic Habitat Benefit (Fish Passage)

A score of 1 was given to Alternative 1 as the existing channel is considered to cause fish barrier and impede fish passage. Although this option will not result in disturbance to the existing conditions as a result of construction, it was ranked lowest because of the non-supportive condition. Alternative 3 was also scored a 1 because the on-line pond configuration will create a similar impediment for fish habitat.

A score of 3 was given to Alternative 2 as the proposed separation and naturalization of the channel will improve fish passage and provide an enhanced support of the aquatic habitat.

Potential Aquatic Habitat Benefit (Water Temperature)

The existing dry pond facility does not provide any mitigation measures for increased water temperature due to upstream urban development. The proposed on-line pond configuration will not allow for separation of flows from the north and northeast inlets. Water temperatures from flows entering the pond under storm events will not be effectively mitigated, with no expected benefit to water temperature realized. As such, Alternative 1 and Alternative 3 were assigned a score of 1.

The proposed off-line pond configuration will effectively control inflows from the north outlet. A suitably sized permanent pool meeting water quality targets can limit the effects of temperature from the contributing upstream urbanized development. Therefore, effluent from the off-line facility will be introduced to the downstream creek with an added benefit to water temperature. The remaining inflows from the northeast outlet will continue to outlet to the new naturalized channel, however, no significant change to the existing water temperatures is expected. Alternative 2 has been assigned a score of 3.

Potential Water Quality Benefit

The existing dry pond facility does not provide any mitigation measures for water quality. The proposed on-line pond configuration will not allow for separation of flows from the north and northeast inlets. Due to sizing constraints, it would not be feasible to provide a large enough permanent pool to treat the combined contributing area. Water Quality from flows entering the pond under storm events will not be treated to the appropriate protection level, and the expected large inflows will result in constant resuspension of settled particles. A limited improvement to water quality under this configuration will be realized. As such, Alternative 1 and Alternative 3 were assigned a score of 1.

The proposed off-line pond configuration will effectively control inflows from the north outlet. A suitably sized permanent pool meeting water quality targets for an enhanced level of protection can effectively mitigate the impacts of urban development on water quality. Therefore, effluent from the off-line facility will be introduced to the downstream creek with an added benefit to water quality. The remaining inflows from the northeast outlet will continue to outlet to the new naturalized channel, however, no significant change to the existing water quality is expected. Alternative 2 has been assigned a score of 3.

Potential to Reduce Downstream Flooding and Erosion

Alternative 1 has been assigned a score of 1 because maintaining the existing conditions will not result in any changes to downstream flooding and erosion.

Alternatives 2 and 3 have both been assigned a score of 4 because both options will result in an increased extended detention volume and active storage volume within the pond. Flooding and erosion controls have not been designed to a specific standard; however, the positive effects of both options are considered to be similar to each other, and an improvement from the 'Do Nothing' alternative.

4.5.2 Social/Cultural Environment

Potential to Provide Public Health and Safety Objectives

Alternative 1 has been assigned a score of 4 because maintaining the existing conditions will not impose any risk to public health and safety.

Alternative 2 has been assigned a slightly lower score of 3, to account for the risk associated with construction. However, construction work is expected to remain confined to within the subject site.

Alternative 3 has been assigned the lowest score of 1 as the larger impacted area may affect private property and adjacent roads during construction. Additionally, an on-line pond may pose additional hazards under winter conditions.

Aesthetic / Recreation Benefits

The 'Do Nothing' alternative will result in no added benefit to the aesthetic and recreation purposes of the existing facility. Alternative 1 has been scored 1.

The off-line pond configuration incorporates the separation berm between the pond and the channel section, creating an opportunity to implement walking trails into the design. This is considered desirable to promote an integrated approach for recreation and education. Alternative 2 has been assigned a score of 4.

The on-line pond configuration will result in a larger impacted area, with limited space to promote recreation. Additionally, the hazard of the combined creek and pond within a small urban setting is not beneficial to aesthetic and recreation purposes. This option has also been assigned a value of 1.

Compatibility with Adjacent Land Use

A score of 4 was given to Alternatives 1 and 2 as both options provide good compatibility with the adjacent residential properties. Access and egress to the facilities is also not expected to be an issue.

A score of 1 was given to Alternative 3 as this option may cause more impacts to the adjacent residential properties to account for the larger contributing area to the facility. Also, access/egress is likely to be constrained for the same reasons.

Potential Community Disruption

Alternative 1 was scored the highest value of 4, as no disruption to the community will occur under the 'Do Nothing' scenario.

Alternative 2 was scored slightly lower with a value of 3, to account for traffic disruption and disruptions to adjacent property owners during construction.

Alternative 3 was scored the lowest value of 1, to account for the added disruptions caused by limited staging areas and additional disruption to adjacent residential properties during construction.

4.5.3 Economic/Financial

Capital Construction Costs

Alternative 1 will have no construction costs and was assigned a score of 4, followed by Alternative 2 which will involve construction costs and given a score of 2. Alternative 3 having the highest construction costs associated with location, more limited construction access, limits for construction staging, and less area to dispose of excavated materials was given the lowest score of 1.

Operation/Maintenance Costs

Alternative 1 is expected to have the lowest maintenance costs, where routine maintenance may include cleaning the existing facility, inlets/outlets, and other associated structures of debris blockage that may accumulate over time as a result of sedimentation. Therefore, the highest score of 4 was assigned.

Alternative 2 is expected to require additional maintenance, associated with the implementation of the stormwater management wet pond. The City's operation and maintenance schedule will need to be updated to ensure that routine inspection of the inlet/outlet structures is performed. Sediment removal frequency will need to be established to ensure that the pond functions as intended throughout its life cycle as well. Therefore, Alternative 2 has been assigned a slightly lower score of 2.

Alternative 3 is expected to result in the highest maintenance costs, as the on-line wet pond will be undersized to effectively treat the upstream contributing area. Heavy sedimentation loading will require more frequent removal, and as such, the City's operation and maintenance schedule will also need to be more frequent to monitor the performance of the facility. Obstructions of the inlet/outlet structures will be more likely as well, so maintenance activities will be more rigorous on a more frequent basis. This alternative was assigned the lowest score of 1.

Protection of New/Existing Infrastructure

Alternative 1 was assigned a score of 2, as although no new risks are posed by the alternative, the existing facility does not provide any level of treatment for stormwater, and therefore existing infrastructure is not protected in any way either.

Alternative 2 was assigned the highest score of 4, as the off-line pond facility provides the best option for treating stormwater. The proposed pond will be adequately sized to ensure the pond functions as intended, and with a suitable maintenance program, new infrastructure will be properly protected.

Alternative 3 was assigned the lowest score of 1, because although the wet pond facility does provide a water quality improvement from the 'Do Nothing' alternative, it cannot be implemented in an efficient way. Therefore, new infrastructure is not expected to be well protected by this alternative.

4.5.4 Technical

Ease of Implementation

Alternative 1 was assigned the highest score of 4, as the existing conditions will be maintained.

Alternative 2 was assigned a score of 3, higher than Alternative 3 which was scored 1, because greater difficulties with implementation of Alternative 3 are expected. Specifically, constructability will be more difficult for the on-line configuration, as a flow by-pass will be required to complete the pond and creek work. Whereas Alternative 2 will be able to complete the

majority of the creek work while the existing watercourse remains functioning. Once creek rehabilitation is completed, the watercourse can be transferred to the new creek and pond work can commence independently, without a separate bypass. Also, it is expected that approvals will be more difficult to obtain for Alternative 3.

Agency Acceptance

Alternative 2 was assigned the highest score of 4, as it is expected that this option will be accepted by the representative approving agencies.

Alternatives 1 and 3 were both assigned a value of 1, as these alternatives do not meet any specific design criteria and will likely be least acceptable to approving agencies.

Meets Policy/By-law Requirements

Alternative 1 was assigned a score of 1, since by-law requirements will not be impacted. However, the City of Vaughan is seeking to ensure that stormwater management facilities managed by the City are effective in meeting design guidelines and requirements. Therefore, this option does not meet planning policy requirements.

Alternative 2 was assigned the highest score of 4, as it is expected that this option will meet planning policy and by-law requirements set out by the City.

Alternative 3 was assigned a score of 2, since this option does improve the existing conditions with respect to design guidelines and requirements. However, it does not meet specific design objectives and therefore scores lower than Alternative 2.

Technical Feasibility

Alternative 1 was assigned the highest score of 4, as it remains the most technically feasible.

Alternatives 2 and 3 were both assigned scores of 3 as they are both equally feasible for implementation.

Ease of Maintenance

Alternative 2 was assigned a score of 4, as this option provides a design that effectively meets design criteria, therefore ensuring that maintenance will be standard and manageable.

Alternatives 1 and 3 were assigned equivalent scores of 1, as neither option meets a specific maintenance standard.

4.6 Public, Stakeholder, and Agency Consultation

Throughout the study process, an extensive consultation program that involved the public, stakeholders and representatives of the various agencies was implemented. The process included an online Public Information Centre (PIC).

These points of contact satisfied the general criteria defined within the Municipal Class EA process for Schedule B projects, where a mandatory two (2) points of public contact are required. Moreover, the following public and agency interactions were completed:

- Notice of Study Commencement;
- Notice of online PIC;
- EA Study Information Slides and narrated video (presented at the online PIC); and
- Notice of Completion.

An overview of the PIC boards and a summary of the consultation program are presented below.

4.7 Notice of Commencement

Public consultation is a mandatory and critical part of the Schedule B Municipal Class EA process, to ensure full transparency and public involvement. A newsletter was mailed in July 2021 to 604 residents to notify the public of the project. A Notice of Commencement was also published on the City of Vaughan website on March 18, 2022, and issued in the March 24th, 2022 edition of the Vaughan Citizen newspaper, providing further information regarding the Public Information Centre (PIC) held virtually via Webex on March 30, 2022 from 7:00pm to 8:00pm. The notice was also mailed to 53 residents. A copy of the notice is included in Appendix C.

The purpose of the notice was to notify the public that a Class EA study has been initiated, to provide background on the problem definition, and to provide the contact information for the representatives of the City and Aquafor who the public could engage with throughout the study process.

4.8 Public and Stakeholder Consultation

4.8.1 Public Information Centre

Due to the ongoing Public Health Emergency related to COVID-19, an online Public Information Centre (PIC) was arranged to allow local residents and interested members of the public an opportunity to review and comment on the project findings to date, the alternative solutions being considered and the evaluation process. The online PIC included a narrated video presentation and online survey platform to gather input and feedback. The PIC materials were made available to the public on the City's website and emailed to the registered attendees.

The presentation narrated a set of boards outlining the study purpose, background, findings, as well as next steps. A copy of the PIC boards presented is attached in Appendix F3. The presentation boards outline the following items:

- The study area
- The objectives of the study and the purpose of the public information package;
- The Municipal Class EA – Schedule B process;
- The existing conditions within the study area;
- The problems and opportunities;
- The site specific inventories and findings through the study;
- The alternatives for the study areas;
- The evaluation criteria and preliminary scoring; and
- The next steps in the process.

In total, two (2) people attended the meeting and each were provided a Comment Sheet to provide feedback. Generally, those whom project staff spoke with were supportive to see this initiative being undertaken in the area.

Input from the public was limited but did include a local resident who expressed concern regarding the removal of large trees along Pine Valley Drive. This concern was not expected to be met with opposition, however. Additionally, the resident noted that the western portion of the study area was disturbed in the Fall of 2021. The restoration of this area was discussed with City Staff.

4.8.2 Indigenous Consultation

First Nations, including the Alderville First Nation, Beausoleil First Nation, Chippewas of Georgina Island, Chippewas of Rama First Nation, Curve Lake First Nation, Hiawatha First Nation, Mississaugas of Scugog Island First Nation, and the Mississaugas of the Credit First Nation were notified about the project at the time of initiation of the study and prior to the date of the PIC, together with all stakeholders. In addition, separate letters were directly sent to the points of contact of the First Nations to notify about the study. No correspondence was received in response to the letters. Upon filing the project, the Notice of Completion along with the Project File Report will be provided to the First Nations for review and comments.

5 SELECTION AND DESCRIPTION OF THE PREFERRED ALTERNATIVE

5.1 Preferred Solution and Preliminary Design Concept

Based on the results of the alternatives evaluation and in consultation with the City, agencies and the public, Alternative #2 (Off-line pond facility) was selected as the preferred alternative. In summary, this alternative has a nominal impact on the natural environment, is preferred with respect to impact on adjacent residents and commuters, is the most cost-effective, has no requirements from a property acquisition perspective and is technically feasible.

5.2 Description of the Preferred Alternative

This section of the report identifies the key components of the preferred alternative that were developed for this Environmental Assessment.

The preferred alternative for the Villa Park Pond will include the design of an off-line wet pond facility, treating contributing inflows from the north inlet. As part of the proposed works, the existing pond will be further excavated, providing a sediment forebay at the inlet to remove suspended sediment, and a secondary permanent pool storage cell that provides continued pollutant removal, extended detention, and a cooling benefit for stormwater effluent. These additional features are intended to improve water quality control in the pond, including decreasing the sedimentation of the pond itself as well as at the downstream outlet. Decreased sediment loads are expected to provide additional protection of significant vegetation, and thereby aiding in sustaining downstream habitat. The design of a sediment forebay would improve operation and maintenance activities including ongoing sediment removal. This alternative constitutes a low operation and maintenance burden.

To allow for the off-line configuration, the existing channel will be realigned and designed with a separation berm, to keep inflows from the northeast outlet separated from inflows from the north inlet. The new off-line facility would treat a contributing area of 29 hectares with an estimated imperviousness level of 53%, providing 73% of the required enhanced target for Level 1 quality control. SWM Shield structures will also be incorporated into the design of the north inlet structure to improve sediment retention and helping to meet enhanced water quality targets.

The longitudinal profile of the proposed channel is in line with existing planform configurations. The channel utilizes the current grade of the existing bed to connect the two existing culverts while maintaining a spillway with the off-line stormwater pond. An average channel width of 7.5 m is maintained, allowing a bank full discharge approximately equivalent to the 2-year flood.

The proposed longitudinal profile provides a riffle-pool sequence, following the planform configuration. With fixed tie-in elevations at both ends, the proposed channel maintains the same average slope as the existing channel, with grades on the proposed riffles ranging at 3.0%.

At the downstream tie in-in, a scour pad will be embedded and flush to prevent undermining due to erosion. The upstream portion will be flush with the inverts of the culverts to reduce undermining and any headwall detachment. The substrate in channel is sized according to channel hydraulics.

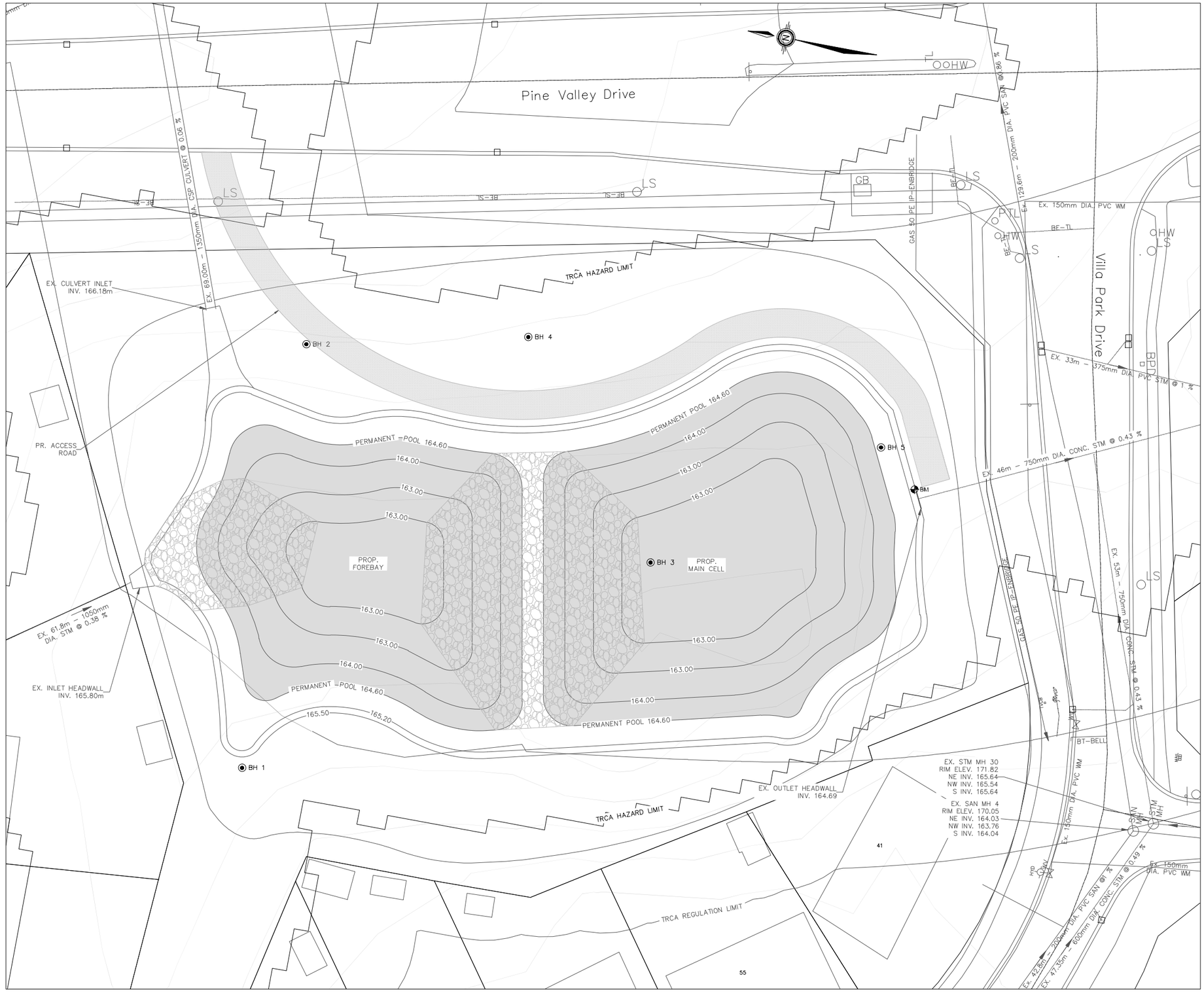
Vegetated buttresses are proposed to form banks of the outer bends to further stabilized the proposed channel while creating a more natural form. The vegetated buttresses are composed of layers of roundstone with the void space filled with smaller roundstone and native soil. The surface will be amended with topsoil, planted with native shrubs (potted stock), and terraseeded with a native seed mix. The hard materials are proposed to stabilize the banks with the native materials filling the voids and supporting vegetation growth.

Table 5.1 provides a summary of the overall environmental benefits of the preferred solution as compared to the general EA alternatives for the pond.

A conceptual design of the proposed solution is provided in **Figure 5.1**.

Table 5.1: Summary of Overall Environmental Benefits of the Villa Park Pond Alternatives

Alternative		Alternative 1 – Do nothing	Alternative 2 – Off-line Facility and Channel Realignment	Alternative 3 – On-line Facility
DA (ha)		234	29	234
Water Quality	Permanent Pool Volume (m^3)	0	3,078	3,694
	% MOE Enhanced Level Requirement	0%	73%	11%
	Extended Detention Volume (m^3)	0	1433	1,720
	% MOE Enhanced Level Requirement	0%	123%	18%
	Additional Sediment Removal	None	Sediment removal efficiency increased with SWM Shields at inlet	Contributing area is too large to effectively implement SWM Shield or similar design.
Cost	Capital Cost	$ 0.00	$ 3,200,000.00	$4,300,000.00
	Operation and Maintenance	Low	Moderate	High
Benefits	Flooding Control	Maintain Ex. Levels	Increased Active Storage provides additional flood control	Increased Active Storage provides additional flood control
	Aquatic Life and Habitat	None	Reduced sediment loads. Improved temperature regime. Channel naturalization riffle/pool design improves fish passage. Designed substrate sizing to mitigate erosion impacts	No channel naturalization
	Terrestrial Systems	No impacts to existing trees/ vegetation Not supportive of wildlife and habitat	Impacts to existing trees/ vegetation, Can be offset with additional plantings Vegetated buttresses for channel naturalization will stabilize banks and support vegetative growth and habitat.	Greater impacts to existing trees/ vegetation, Can be offset with additional plantings



KEY PLAN

CONTRACTOR'S NOTES:

1. ALL DIMENSIONS ARE IN METRES AND UNLESS OTHERWISE INDICATED
2. DRAWINGS ARE NOT TO BE SCALED.
3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD AND SHALL REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY UPON FINDING.
4. THE EXACT LOCATION OF UTILITIES SHALL BE DETERMINED BY CONSULTING THE UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.
5. BENCHMARKS FOR LAYOUT ARE TO BE OBTAINED FROM THE CITY OF VAUGHAN ENGINEERING DEPARTMENT.

NOTE:

EVERY REASONABLE EFFORT HAS BEEN MADE TO ENSURE THAT THE INFORMATION APPEARING ON THIS PLAN IS ACCURATE AND CURRENT. WE BELIEVE THE INFORMATION TO BE RELIABLE, HOWEVER, THE CITY OF VAUGHAN ASSUMES NO RESPONSIBILITY OR LIABILITY DUE TO ERRORS OR OMISSIONS.

BM: E: 614654.21
N: 4849336.52
ELEV.: 166.393

NO.	DESCRIPTION	BY	DATE
8			
7			
6			
5			
4			
3			
2			
1	30% DESIGN SUBMISSION	G.T.	SEP. 2020

UPDATES & REVISIONS

ENGINEERING COMPANY NAME:

Aquafor Beech Limited
2–222–3600 SIXMARK Ave.
MISSISSAUGA, ONTARIO, L4W 0B2
PHONE: (905) 629–0099, FAX: (905) 629–0089
55 REGAL ROAD, UNIT 3
GUELPH, ONTARIO, N1K 1B6
PHONE: (519) 224–3750

ENGINEER'S STAMP:

APPROVED AS TO FORM IN RELIANCE, UPON THE PROFESSIONAL SKILL AND ABILITY OF THE CONSULTING ENGINEERS AS TO DESIGN AND SPECIFICATIONS.

JACK GRAZIOSI, P.Eng., M.Eng.
DIRECTOR OF INFRASTRUCTURE DELIVERY

DATE

SCALE

HORIZONTAL: 0 10 20 40

VILLA PARK POND

PROPOSED CONDITIONS - ALTERNATIVE 3
ONLINE FACILITY AND CREEK RECONSTRUCTION

VAUGHAN
Infrastructure Delivery

DESIGNED & DRAWN BY: G.T.	CHECKED BY: W.C.	TENDER No.
SURVEYED BY: ____	APPROVED BY: D.M.	
SCALE: N.T.S	PROJ. No.	DWG. No. 5.1

Printed: Mar. 21, 2022

Acad File: R:\Desktop\Current Projects\City of Vaughan\VB3717 - DMP Phase 2\VA Concepts\Site #3 - Alt 1\3.dwg Layout: Sheet 3 - PR COND

6 IMPLEMENTATION CONSIDERATIONS

This chapter will summarize the implementation considerations associated with the various elements of the Preferred Alternative as described in Chapter 5.

The next steps for implementation of the preferred alternative include:

- Issuance of the Notice of Completion;
- Preparation of detailed design;
- Permitting and Approvals process;
- Contract document preparation and tender;
- Construction; and
- Post-construction monitoring.

6.1 Notice of Completion

The Notice of Completion will be provided to all stakeholders, agencies and residents on the study distribution list, and copies of the Project File report will be available for review by the public.

6.2 Detailed Design and Investigations

The detail design package should include the preparation of 90% complete and final design drawings for review by the City, TRCA and relevant stakeholders. The detailed design package should include, but not be limited to, the following components:

- General plan (detailing structures, property lines and services);
- Site plan (including site access, staging and stockpile area delineation);
- Plan and profile drawings (detailing the sediment forebay, permanent pool, separation berms, extended detention, inlet/outlet structures, and proposed creek planform and channel profile);
- Erosion and sediment control plan (as per the Erosion and Sediment Guidelines for Urban Construction, GGHACA);
- Landscape restoration plan (including tree removal, preservation and planting plan);
- Storm outfall restoration plan; and
- Associated design brief.

The following implementation measures must be considered at the detailed design and implementation stages:

General Implementation Considerations

- Maintaining appropriate access during construction activities should be considered, as should minimizing disruptions to the public in general;
- Community/public use of the facility and channel is considered low;

- Confirmation of seasonally high groundwater and static groundwater levels may be warranted prior to any construction activities taking place. Preliminary geotechnical data taken during August/September 2021 indicate a groundwater depth ranging from 1.6 m to 3.2 m below existing ground surface.
- Erosion & sedimentation control techniques are necessary precautions to minimize sediments entry into surrounding creeks and/or storm sewer pipes. Installation and maintenance of the necessary sediment and erosion control techniques shall be done prior to construction.
- An allowance should be made for fish rescue operations/plans where works have the potential to injure, trap or disturb existing fish populations.
- TRCA watercourse permits under "Schedule 'A' Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourse Permit (Pursuant to Ontario Regulation 166/06)" under the category of 'Infrastructure Planning' will be required for any and all works as they pertain to watercourse alterations and or outfall construction or alteration.
- Appropriate construction supervision in order to ensure that the objective of the preferred alternatives and the detailed design are achieved, it is important that an experienced individual in design be part of the construction supervision. The supervision will enable construction issues to be addressed quickly and appropriately. This individual will be on-site to ensure that important design details are appropriately implemented with minimal environmental disturbance.

Hydrogeological and Geotechnical Investigations

A hydrogeological investigation should be carried out as recommended in the preliminary geotechnical investigation. This may need to be supplemented with additional geotechnical investigation as well.

Geotechnical Considerations

Preliminary geotechnical data suggests that site soils will generally be comprised of a surficial layer of topsoil, underlain by a sandy silt/clayey silt fill layer. Native material appears to consist of a clayey silt/ silty clay deposit, and a sandy silt/silty sand seam was also identified. The pond base and side slopes will be comprised of native clayey silt to sandy silt. In order to reduce seepage/piping and groundwater intrusion into the pond, an impervious liner is recommended to be constructed.

Dewatering

Preliminary geotechnical data indicates the highest ground water levels encountered occurred at about 1.6 m below existing grade. Excavation for trenches, the pond, and creek realignment are expected to intercept the ground water table. Within the clayey deposits, excavations are expected to be temporarily stable, where gravity pumps in temporary sumps is expected to manage the slower rate of seepage.

Sandy silt or silty sand seams will be more pervious and yield more water in excavations extending below the groundwater table. It is recommended to complete further hydrogeological studies to verify suitable construction dewatering practices.

Hydraulic Assessment

A detailed hydraulic assessment of the proposed conditions will be conducted and the results will be included in the detailed design brief. Computation of peak velocities for bank full and peak floods will be included and incorporated into evaluation of the proposed remedial measures. The assessment will be used to confirm that no negative flooding impacts will result from the proposed works, a condition of the TRCA permit.

Excess Soils Management during Construction

Based on the scope of work, the proposed work will generate an excess material that will need to be managed in accordance with Ontario Regulation (O.Reg) 153/04, including testing requirements. Soil that is tested and deemed to be suitable for re-use at the subject site should be incorporated into the proposed earthworks where applicable. Excess soil generated will need to be taken off-site and managed at a site with land-use meeting the same requirements. Soils deemed suitable for reuse on site shall will be handled in accordance with O.Reg. 406/19.

Construction Timing

As outlined in the federal *Fisheries Act,* discussed below, the proponent is to exercise mitigation measures to avoid contravention with the Act and exercise due diligence by further mitigating accidental death of fish and the harmful alteration, disruption or destruction of fish habitat. With the proposed works being undertaken within and/or adjacent to the East Humber River tributary, construction should be undertaken such that the construction timing will be limited to outside of the critical life stages of the fish community listed above in **Section 3.2.4**. The In-water Work Timing Window Guideline (MNRF, 2013) outlines that based on the reproduction requirements of the fish community within the watercourses and the study site within them, that no in-water works are to take place **between March 15th and July 15th** of any given year to respect spring spawning species for the MNRF Southern Region. In-water work includes but is not limited to the discharges of water from dewatering activities into the watercourse, as well as work conducted on the outlet structure of a pond into a watercourse.

Tendering Support for Construction

All tender documentation will be completed applicable to the City of Vaughan standards, with Special Provisions and Schedule of Quantities with refined engineering cost estimates provided. The package will include Project Descriptions, Special Provisions, Specifications, Form of Tender and a Schedule of Prices. The final detailed design drawings will be issued as a set of contract drawings with the completed tender package. The contract drawings will be stamped by a professional engineer, signed, and labeled "Issued for Tender" complete with all necessary

material and performance specifications. Aquafor will typically assist the City during the tendering and procurement period as required, providing responses and clarification to bidders during the procurement process.

Maintenance Access

Maintenance access to the existing facility is limited by private properties and natural areas surrounding the facility. An access road is proposed to be installed to allow for proper operation and maintenance inspection and activity.

6.3 Permits and Approvals

The following permits and approvals will likely be required prior to undertaking construction activities:

- Toronto and Region Conservation Authority watercourse permits under "Schedule 'A' Application for Development, Interference With Wetlands and Alterations to Shorelines and Watercourse Permit (Pursuant to Ontario Regulation 166/06)". Any potential fishery windows should also be discussed and confirmed with TRCA
- MECP Environmental Compliance Approval (ECA) – required for the construction or alteration of the existing facility
- Fisheries and Oceans Canada Regulatory Review: The federal *Fisheries Act* requires that projects avoid causing the death of fish and the harmful alteration, disruption or destruction of fish habitat unless authorized by the Minister of Fisheries and Oceans Canada (DFO). This applies to work being conducted in or near waterbodies that support fish at any time during any given year or are connected to waterbodies that support fish at any time during any given year. As noted above, the study area(s) does contain fish at any time during any given year. Therefore, the *Fisheries Act* applies to works conducted in or near water at the site.

  The proposed alternative has been cross-referenced with the DFO "Projects Near Water" online service to determine if a request for regulatory review under the federal *Fisheries Act* is required (Department of Fisheries and Oceans, 2019). Based on field investigations conducted by Aquafor staff and background information provided by the TRCA, the study area does contain fish at any time during any given year. It is therefore the opinion of Aquafor Beech Limited that a request for regulatory review by Fisheries and Oceans Canada will be required. Measures listed by Fisheries and Oceans Canada will be incorporated into the design to avoid contravention with the Federal *Fisheries Act* and exercise due diligence by further mitigating accidental death of fish and the harmful alteration, disruption or destruction of fish habitat.

- MNDMNRF Fish and Wildlife Permits: The provincial Fish and Wildlife Conservation Act, administered by the MNDMNRF, governs the lawful hunting and trapping of fish and wildlife. Ontario Regulation (hereafter O.Reg.) 664/98, created under the Act, specifically requires that a license be obtained for fish collection. During the creation of the SWMF, including works within the watercourse, any collection, handling and deposition of fish would require a "License to Collect Fish for Scientific Purposes", which is issued by the MNDMNRF. Under the Act the MNDMNRF also regulates the collection and handling of any wildlife species listed as protected in Schedules 6 through 11 of the Act. The lists of protected species include several amphibians (e.g. Jefferson Salamander) and reptiles (e.g. Midland Painted Turtle) that could be found in and around SWMFs. Any collection, handling and deposition of protected wildlife species that may be necessary during a SWMF clean out project requires that a "Wildlife Scientific Collector's Authorization" be obtained from MNDMNRF. It is recommended that a group of qualified biologists be consulted with before and during the maintenance works to ensure any and all fish and wildlife is handled appropriately.

6.4 Contract Document Preparation and Tender

A tender document shall be prepared for the project with the intent that the proposed works be publicly tendered. The tender will be consistent with the requirements of the City of Vaughan standards. The package shall include several sections common to most tenders, as well as sections on:

- Standard specifications and special provisions;
- Schedule of prices;
- Detailed Cost Estimate based on tender schedule of prices; and
- Final detailed design drawings.

6.5 Construction

The proposed construction timing will be based on subsequent discussions within the City and will be integrated with the proposed timing for the pond reconstruction project schedule.

7 REFERENCES

Chapman, L.J. and D.F. Putnam. 1984. The Physiography of Southern Ontario; Ontario Geological Survey, Special Volume 2. Government of Ontario, Ontario. Pp 114-122.

NHIC (Natural Heritage Information Centre). 2015a. Srank Definitions. http://nhic.mnr.gov.on.ca/MNR/ nhic /glossary/srank.cfm

NHIC (Natural Heritage Information Centre). 2015b. NHIC Species Lists. Available at: http://www.mnr.gov.on.ca/en/Business/NHIC/2ColumnSubPage/STDU_138223.html

Jersey Creek – Villa Park Pond Retrofit

Environmental Assessment and Conceptual Design

Appendix A

Breakdown of Costs for Preferred Alternative

FORM OF OFFER
SCHEDULE OF QUANTITIES & UNIT PRICES

CITY OF VAUGHAN
SITE 3 - STORM WATER MANAGEMENT FACILITY RETROFIT

CONTRACT NUMBER: XX XXX XXXX XXX XX

SECTION "A" - SITE PREPARATION

ITEM	SPEC NO.	DESCRIPTION	EST QTY	UNIT	UNIT PRICE	AMOUNT
A1	SP1	BONDS & INSURANCE	100%	L.S.	$ 50,000.00	$ 50,000.00
A2	SP2	MOBILIZATION & DEMOBILIZATION	100%	L.S.	$ 60,000.00	$ 60,000.00
A3	SP 3, GN1.3	FIELD OFFICE	100%	L.S.	$ 30,000.00	$ 30,000.00
A4	SP 4, G-108, OPSS.MUNI 703	PROJECT SIGN	2	ea	$ 1,500.00	$ 3,000.00
A5	SP5	CONSTRUCTION LAYOUT	100%	L.S.	$ 15,000.00	$ 15,000.00
A6	SP 6	PRE & POST-CONSTRUCTION CONDITION SURVEYS	100%	L.S.	$ 10,000.00	$ 10,000.00
A7	SP 7, SW1.1, SW1.2, OPSS.MUNI 409, OPSS 411	FLUSHING AND CCTV OF SEWERS				
		A) PRECONSTRUCTION	351	m	$ 10.00	$ 3,510.00
		B) POST CONSTRUCTION	376	m	$ 10.00	$ 3,760.00
A8	SP8	STAGING AREAS, SITE ACCESS, AND MUDMAT, INCLUDING STEEL PLATE PROTECTION, STREET SWEEPING, & RESTORATION	100%	L.S.	$ 20,000.00	$ 20,000.00
A9	SP9, OPSS.PROV 201	CLEARING & GRUBBING INCLUDING TREE REMOVALS	100%	L.S.	$ 20,000.00	$ 20,000.00
A10	SP12	TEMPORARY WILDLIFE EXCLUSION FENCING	400	m	$ 30.00	$ 12,000.00
A11	SP 13, LD5.3.1, OPSS.MUNI 801, OPSD 220.010	TREE PROTECTION FENCING	235	m	$ 20.00	$ 4,700.00
A12	SP 41	FISH & WILDLIFE RESCUE	100%	L.S.	$ 5,000.00	$ 5,000.00

TOTAL FOR SECTION 'A' SITE PREPARATION **$ 236,970.00**

SECTION "B" - POND WORKS

ITEM	SPEC NO.	DESCRIPTION	EST QTY	UNIT	UNIT PRICE	AMOUNT
B1	SP14	SURFACE DEWATERING INCLUDING EROSION & SEDIMENTATION CONTROLS	100%	L.S.	$ 25,000.00	$ 25,000.00
B2	SP15, OPSS 518 & 805	GROUNDWATER DEWATERING	100%	L.S.	$ 80,000.00	$ 80,000.00
B3	SP 16, OPSS.MUNI 180, 802, 206, 802, 805	TOPSOIL STRIPPING A) DISPOSAL OF MATERIALS OFFSITE	8600	m2	$ 15.00	$ 129,000.00
B4	SP 17, OPSS.MUNI 180, 206 & 510, O.Reg 406/19	EXCAVATION, EARTHWORK, STOCKPILING, GRADING, REUSE & DISPOSAL OF MATERIALS OFFSITE A) DISPOSAL OF MATERIALS OFFSITE (ESTIMATED VOLUME = 4300 m3)	100%	L.S.	$ 215,000.00	$ 215,000.00
		B) REUSE OF MATERIALS ONSITE ((ESTIMATED VOLUME = 1100 m3)	100%	L.S.	$ 16,500.00	$ 16,500.00
B5	SP18, OPSS.MUNI 510	REMOVALS (A) TERRAFIX CHANNEL (EST LENGTH = 140m)	100%	L.S.	$ 15,000.00	$ 15,000.00
		(B) SIDEWALK REMOVAL	6	m2	$ 35.00	$ 210.00
		(C) CURB REMOVAL	8	m	$ 32.00	$ 256.00
		(D) HEADWALL AND RAILING	1	ea	$ 2,000.00	$ 2,000.00
		(E) 750mm CONC. STM SEWER	13	m	$ 350.00	$ 4,550.00
		(F) CHAIN-LINK FENCING	15	m	$ 50.00	$ 750.00
		(G) OUTLET GABION BASKETS	100%	L.S.	$ 15,000.00	$ 15,000.00
B6	SP 19, OPSS 180, OPSS.MUNI.206, 802 & 1004	SUPPLY AND INSTALL ARMOURSTONE A) SPILLWAYS	25	m2	$ 700.00	$ 17,500.00
		B) REVETMENTS	180	m2	$ 700.00	$ 126,000.00
B7	SP 21, OPSS 180, OPSS.MUNI.206, 802 & 1004	SUPPLY AND INSTALL ROUNDSTONE A) SOLID FILL BERMS (300-450mm DIA.)	550	m2	$ 125.00	$ 68,750.00
		B) INLET SPILLWAYS (300-450mm DIA.)	160	m2	$ 125.00	$ 20,000.00
		C) OVERFLOW SPILLWAY (300-450mm DIA.)	220	m2	$ 125.00	$ 27,500.00
		D) WATER EDGE TREATMENT (50-100mm DIA)	450	m2	$ 125.00	$ 56,250.00
B8	SP22, OPSS.MUNI 180, 206, 501, 904, 1004 & 1801, OPSS 902 & 919, CSA G164, A23.1-04/A23.2-04, ASTM C457	SUPPLY AND INSTALL HICKENBOTTOM STRUCTURE & APPURTENANCES	100%	L.S.	$ 30,000.00	$ 30,000.00
B9	SP 23, OPSS.MUNI 410, 510, 1010, 1359, & 1841, OPSS 902, OPSD 708.02, 802.010, 802.013, 802.030, RD 4.2, 5.1, 6.1, 8.1, 9.1, 10.1, 10.2, 10.3, 11.1, 12.1 & 13.2, SW 2.1,2.2,2.3, 6.1	SUPPLY AND INSTALL STORM SEWERS (ALL DEPTHS) A) 300mm DIA PVC STORM PIPE, DR-35	20	m	$ 650.00	$ 13,000.00
		B) 750 mm DIA. CONCRETE STORM SEWER CL-65D	18	m	$ 1,200.00	$ 21,600.00
B10	SP 24, OPSS.MUNI 407 & 802, OPSD 701.010, 701.021,702.050, 703.021, 705.010, 705.020, 710.010, 400.012, 404.020 & 404.022, R-125, S-103, S-104, RD 1.1, 1.2, 1.3, 4.2, 5.1, 6.1, 8.1, 9.1, 10.1, 10.2, 10.3, 11.1, 12.1 & 13.2 , SW2.3, 3.1, 4.1, 6.1	SUPPLY AND INSTALL MAINTENANCE HOLES AND CATCHBASINS A) 1800mm DIA. PRECAST MAINTENANCE HOLE	1	ea	$ 16,500.00	$ 16,500.00
		B) 1200mm DIA. PRECAST MAINTENANCE HOLE	1	ea	$ 12,000.00	$ 12,000.00
B11	SP 25, OPSD 804.030, S-101, S-102, FRW-105	SUPPLY AND INSTALL HEADWALL STRUCTURES A) 300mm DIA CONC. OPENING	1	ea	$ 25,000.00	$ 25,000.00
		B) 750mm DIA CONC. OPENING	1	ea	$ 25,000.00	$ 25,000.00
B12	SP 26	ORIFICE PLATE	1	ea	$ 2,000.00	$ 2,000.00

B13	SP 50	GEOSYNTHETIC CLAY LINER	3,900	m2	$	25.00	$	97,500.00
B14	SP 51	SUPPLY AND INSTALL SWM SHIELD	20	m	$	17,000.00	$	340,000.00
B15	SP 55	HEADWALL MODIFICATIONS	100%	L.S	$	10,000.00	$	10,000.00
B16	SP 48	SUPPLY AND INSTALL CONCRETE PIERS	2	ea	$	1,200.00	$	2,400.00
B17	SP 36	SUPPLY AND INSTALL CABLE CONCRETE SPILLWAY	85	m2	$	200.00	$	17,000.00
B18	SP 30, OPSS 802	TOPSOIL FOR RESTORATION						
		A) IMPORT TOPSOIL (450mm DEPTH)	495	m3	$	85.00	$	42,075.00
B19	SP 31	TERRASEED MIXTURE FOR RESTORATION						
		(A) Mesic Woodland Seed Mix	1210	m2	$	9.00	$	10,890.00
		(B) Lowland Wet meadow Seed Mix	2020	m2	$	9.00	$	18,180.00
B20	SP 32, LD 5.1	PLANT MATERIAL FOR RESTORATION						
		(A) Deciduous Trees (60mm)	21	ea	$	550.00	$	11,550.00
		(B) Deciduous Trees (40mm)	23	ea	$	400.00	$	9,200.00
		(C) Deciduous Trees (150-300cm ht)	18	ea	$	325.00	$	5,850.00
		(D) Coniferous Trees (150cm ht)	6	ea	$	350.00	$	2,100.00
		(E) Shrubs (60cm ht)	368	ea	$	55.00	$	20,240.00
		(F) Shrubs (1ltr)	331	ea	$	40.00	$	13,240.00
		(G) Aquatics (10cm ht)	1538	ea	$	9.00	$	13,842.00
B21	SP 39, LD1.1	SOD		m2	$	30.00	$	30.00
B22	SP 33, S-107	POND SAFETY STATION	3	ea	$	1,500.00	$	4,500.00
B23	SP 34, S-106	SWM POND WARNING SIGN	3	ea	$	450.00	$	1,350.00
B24	SP 35, OPSS.MUNI 180, 206, 510, 314, 1010	SUPPLY AND INSTALL MAINTENANCE ACCESS ROAD	1300	m2	$	120.00	$	156,000.00
B25	SP 37, OPSS 353, R-108, R-126, R-128	SUPPLY AND INSTALL CURB AND GUTTER (ALL TYPES)	8	m	$	200.00	$	1,600.00
B26	SP 38, OPSS 351, R-108, R-128	SUPPLY AND INSTALL SIDEWALK	6	m2	$	300.00	$	1,800.00
B27	SP 40, OPSD 980.101	SUPPLY AND INSTALL P-GATES	2	ea	$	2,500.00	$	5,000.00
B28	SP 47	AS-CONSTRUCTED SURVEY AND AS-BUILT DRAWINGS	100%	L.S	$	10,000.00	$	10,000.00
B29	SP 43, O.Reg 903	MONITORING WELLS DECOMISSIONING	3	ea	$	1,200.00	$	3,600.00
B30	SP 20, FRW-105	SUPPLY AND INSTALL PEDESTRIAN GUARD RAIL	95	m	$	450.00	$	42,750.00
B31	SP 52	SUPPLY AND INSTALL STAFF GAUGE	1	ea	$	1,200.00	$	1,200.00
B32	SP 53, G-104	SUPPLY AND INSTALL LEGAL MONUMENT	1	ea	$	10,000.00	$	10,000.00

TOTAL FOR SECTION 'B' POND WORKS **$ 1,816,263.00**

SECTION "C" - CHANNEL WORKS

ITEM	SPEC NO.	DESCRIPTION	EST QTY	UNIT	UNIT PRICE	AMOUNT
C1	SP14	SURFACE DEWATERING INCLUDING EROSION & SEDIMENTATION CONTROLS	100%	L.S.	$ 50,000.00	$ 50,000.00
C2	SP15, OPSS 518 & 805	GROUNDWATER DEWATERING	100%	L.S.	$ 25,000.00	$ 25,000.00
C3	SP 18, OPSS.MUNI 180, 802, 206, 802, 805	TOPSOIL STRIPPING A) DISPOSAL OF MATERIALS OFFSITE	0	m2	$ 15.00	$ -
C4	SP 16, OPSS.MUNI 180, 206 & 510	EXCAVATION, EARTHWORK, STOCKPILING, GRADING, REUSE & DISPOSAL OF MATERIALS OFFSITE A) DISPOSAL OF MATERIALS OFFSITE CHANNEL WORKS (ESTIMATED VOLUME = 400 m3)	100%	L.S.	$ 20,000.00	$ 20,000.00
		SUPPLY AND INSTALL CHANNEL WORKS				
C5	SP 21, OPSS 180, OPSS.MUNI.206, 802 & 1004	A) SUPPLY AND INSTALL CHANNEL SUBSTRATE	1500	tonne	$ 150.00	$ 225,000.00
C6		B) SUPPLY AND INSTALL VEGETATED BUTTRESS STONE	720	tonne	$ 150.00	$ 108,000.00
C7	SP 30, OPSS 802	C) SUPPLY AND INSTALL VEGETATED BUTTRESS TOPSOIL	150	m3	$ 45.00	$ 6,750.00
C8	SP 32, LD 5.1	D) SUPPLY AND INSTALL VEGETATED BUTTRESS PLANTINGS (1L POTS)	268	ea	$ 40.00	$ 10,720.00
C9	SP 49	EROSION CONTROL BLANKET (COIR MATTING)	365	m2	$ 6.00	$ 2,190.00
C10	SP 30, OPSS 802	TOPSOIL FOR RESTORATION A) IMPORT TOPSOIL (300mm DEPTH)	365	m2	$ 25.00	$ 9,125.00
C11	SP 31	TERRASEED MIXTURE FOR RESTORATION (A) Mesic Woodland Seed Mix	365	m2	$ 9.00	$ 3,285.00

TOTAL FOR SECTION 'C' CHANNEL WORKS **$ 460,070.00**

SECTION "D" - PROVISIONAL

ITEM	SPEC NO.	DESCRIPTION	EST QTY	UNIT	UNIT PRICE	AMOUNT
D1	SP 42	TEST PITS AS DIRECTED	3	ea	$ 1,000.00	$ 3,000.00
D2	SP 44	TREATMENT OF SOFT SPOTS	100	m3	$ 150.00	$ 15,000.00
D3	SP 45	ADDITIONAL GEOTEXTILE	100	m2	$ 3.00	$ 300.00
D4	SP 46	HANDSEED AND STRAW MATTING	1850	m2	$ 5.00	$ 9,250.00
D5	SP 11	HEAVY DUTY SEDIMENT FENCING	100	m	$ 25.00	$ 2,500.00

TOTAL FOR SECTION 'D' PROVISIONAL **$ 30,050.00**

CITY OF VAUGHAN
SITE 3 - STORM WATER MANAGEMENT FACILITY

CONTRACT NUMBER: XX XXX XXXX XXX XX

SUMMARY

SECTION 'A' - SITE PREPARATION	**$ 236,970.00**
SECTION 'B' - POND WORKS	**$ 1,816,263.00**
SECTION 'C' - CHANNEL WORKS	**$ 460,070.00**
SECTION 'D' - PROVISIONAL ITEMS	**$ 30,050.00**
TOTAL BID AMOUNT FOR P.N. 14-142 **(TRANSFER TO FIRST PAGE OF FORM OF OFFER)**	**$ 2,543,353.00**

Jersey Creek – Villa Park Pond Retrofit

Environmental Assessment and Conceptual Design

Appendix B

Ecological and Natural Heritage Assessment Study

(Under Separate Cover)

Jersey Creek – Villa Park Pond Retrofit

Environmental Assessment and Conceptual Design

Appendix C

Public Consultation Material

VAUGHAN

Newsletter #1
July 2021

Stormwater Management Facility Improvements

Planned Project Work

As part of the 2021 Capital Works Program, the City of Vaughan is planning improvements to various Stormwater Management Facility (SWMF) and outfall locations. Stormwater management facilities are designed and built to collect rainfall and surface water runoff. The SWMF location is noted on the enclosed map.

Construction is expected to begin in the fall of 2022.

Pre-construction Field Work

This month, City-retained engineering consultants will be in your neighbourhood conducting investigation activities including topographic and/or legal surveys, geotechnical boreholes and other field investigation works. The various underground utilities (i.e. gas, telephone and hydro) will be identified in advance by coloured paint markings.

Traffic Impact

All roads will remain open to traffic while the field investigation work is being carried out by City-retained consultants, under the direction of the Infrastructure Delivery department.

More Details to Follow

Newsletter #2 will be issued prior to construction to provide further details including approximate construction start and end dates.

Thank you in advance for your cooperation. We look forward to completing these important infrastructure upgrades in your area.

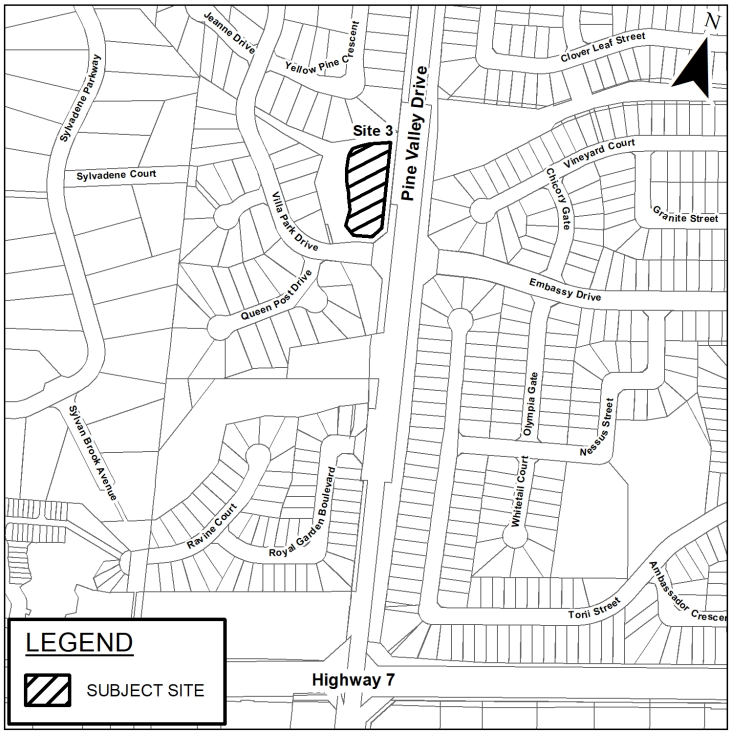
For more information or questions related to this project, contact:

Project Lead:

Alan Manlucu
Project Manager, Infrastructure Delivery
Infrastructure Development, City of Vaughan
T: 905-832-2281 ext. 8468
E: alan.manlucu@vaughan.ca

Engineering Consultant:

Aquafor Beech Limited



Location:

Site 3 – Villa Park Pond
Stormwater Management Pond Improvements
Adjacent to:
Pine Valley Drive
Villa Park Drive

vaughan.ca/**SWMF**

NOTICE

OF STUDY COMMENCEMENT AND PUBLIC INFORMATION SESSION

March 2022

VAUGHAN

Stormwater management improvements are coming to Villa Park Pond

Dear Resident/Property Owner,

Planning and design are moving forward for the City of Vaughan's Stormwater Management Improvements Project. The City is undertaking important stormwater improvements to support the City's continued commitment to ensuring long-term sustainability of municipal infrastructure.

The City of Vaughan has initiated a Schedule 'B' Class Environmental Assessment (EA) study to determine the preferred alternative to protect, maintain and enhance water quality at Villa Park Pond, located on the northwest corner of the intersection between Villa Park Drive and Pine Valley Drive in Woodbridge.

This study includes public and review agency consultation, evaluation of alternatives, assessment of the impact of the proposed works and identification of measures to mitigate any adverse impacts. Upon completion of the study, a Project File Report documenting the planning and decision-making process will be prepared and made available for public review.

The EA study will follow the planning and design process as defined in the Municipal Engineers Association Municipal Class Environmental Assessment document (October 2000, as amended in 2007, 2011 and 2015).

Get Involved

You are invited to participate in an upcoming virtual Public Information Session to learn more about the Environmental Assessment process and study status, stormwater management facilities retrofit alternatives considered, the preferred design option and corresponding benefits, as well as proposed works, project timelines and construction impacts. You will also have the opportunity to share feedback with the project team. Except for personal information, all comments received will become a part of the public record.

The virtual **Public Information Session** will be held on:

Wednesday, March 30, 2022 | 7 p.m. to 8 p.m.
Hosted online via Webex.

Register at **vaughan.ca/SWMF** (click on the **Register** button).
The link to join the session will be provided in advance.

For those not able to participate in the session, the presentation and all related materials will be available for viewing on Friday, April 1, at **vaughan.ca/SWMF**.

Join the Conversation

As public engagement is vital to the development and success of this project, the City encourages citizens to join the conversation – virtually. There will be an opportunity to provide comments during the virtual Public Information Session, or your comments can be submitted via email to either of the contacts below.

If you have any questions or comments about this project or would like to be added to the study mailing list, please contact:

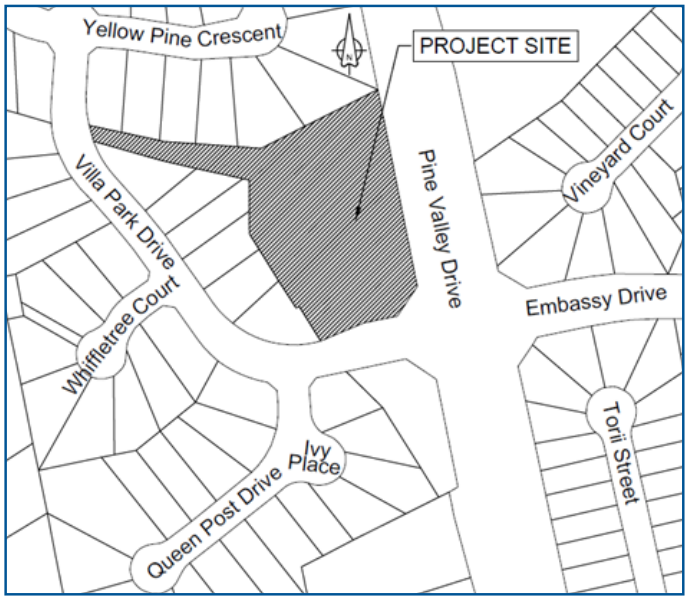
City of Vaughan:
Alan Manlucu, P.Eng.
Project Manager

T. 905-832-2281, ext. 8468
E: **Alan.Manlucu@vaughan.ca**

Project Consultant:
Dave Maunder, MSc., P.Eng.
Project Manager, Aquafor Beech Ltd.

T. 905-629-0099, ext. 290
E. **Maunder.D@aquaforbeech.com**

Location Map



Please contact the Project Consultant regarding any special accommodation requirements.

Comments and information regarding this project are being collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act for the purpose of meeting environmental assessment requirements. With the exception of personal information, all comments received will become a part of the public record.

Notice issued: March 18, 2022

Welcome to the Public Open House for The City Of Vaughan Villa Park Pond Retrofit Schedule "B" Class Environmental Assessment

Public Information Centre #1

March 30, 2022
7:00 pm to 8:00 pm

Project Objective

- City applied for partial funding from the federal Disaster Mitigation Adaption Fund (DMAF) in 2019
- Retrofit **Villa Park Pond (Site 3)** from a dry pond to wet pond.

Environmental Assessment

EA Objective

To identify and evaluate the alternative solutions to permit the retrofit of the Villa Park Pond, including modifications to the existing creek channel.

Purpose of Tonight's Meeting

An opportunity for participants to review and provide comments on the alternatives and evaluation criteria.

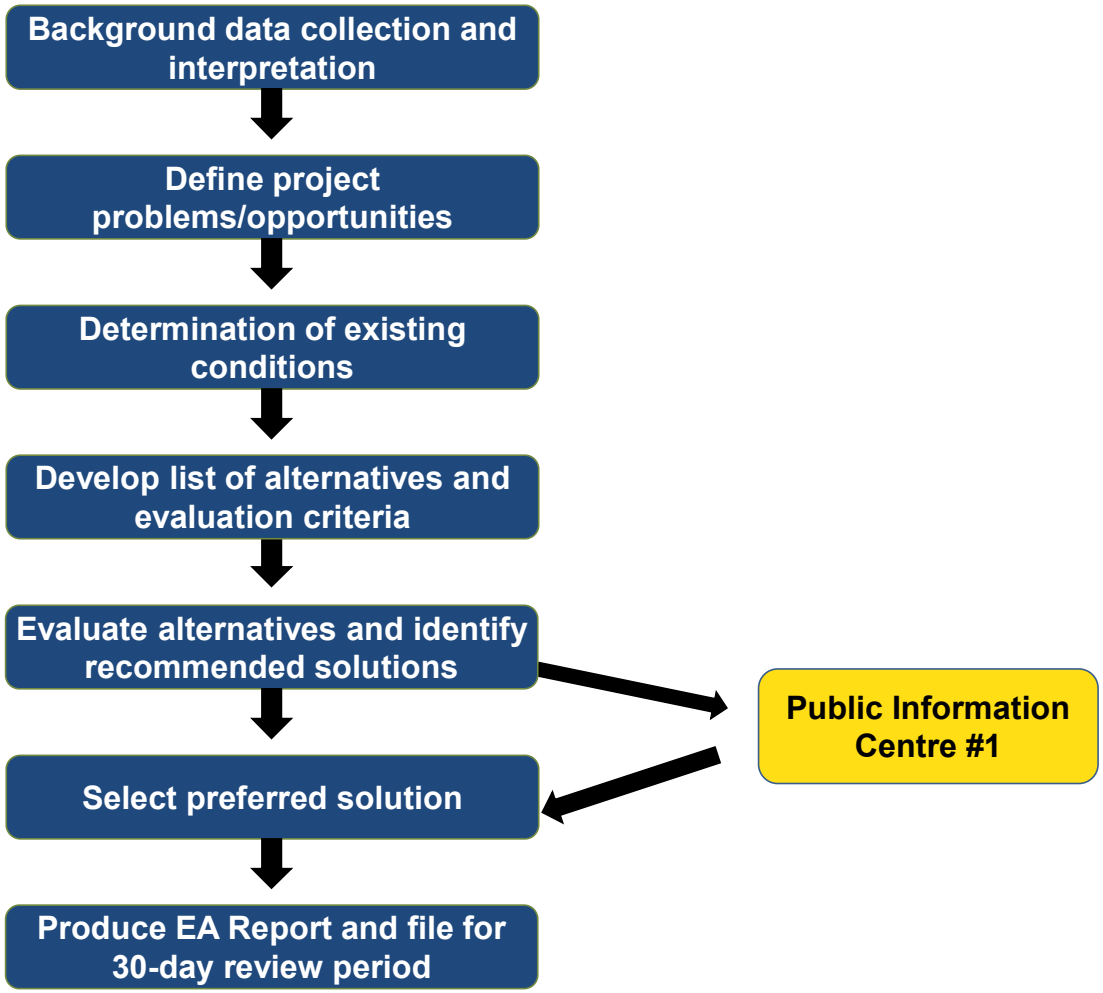
Study Area

Villa Park Pond, located in the north-west quadrant of the Intersection of Pine Valley Drive and Villa Park Drive.

The Study Area incorporates Jersey Creek, a tributary to the East Humber River.

Municipal Class Environmental Assessment Process

This study is being undertaken as a Schedule B project under the Municipal Class Environmental Assessment (EA) Process. The flow chart illustrates the key steps to be undertaken as part of the Class EA process.



Problem and Opportunity

The Project will Assess Alternatives to:

- Naturalize the existing stream to improve environmental habitat
- Retrofit the existing stormwater facility to provide **Water Quality** and **Erosion Control**

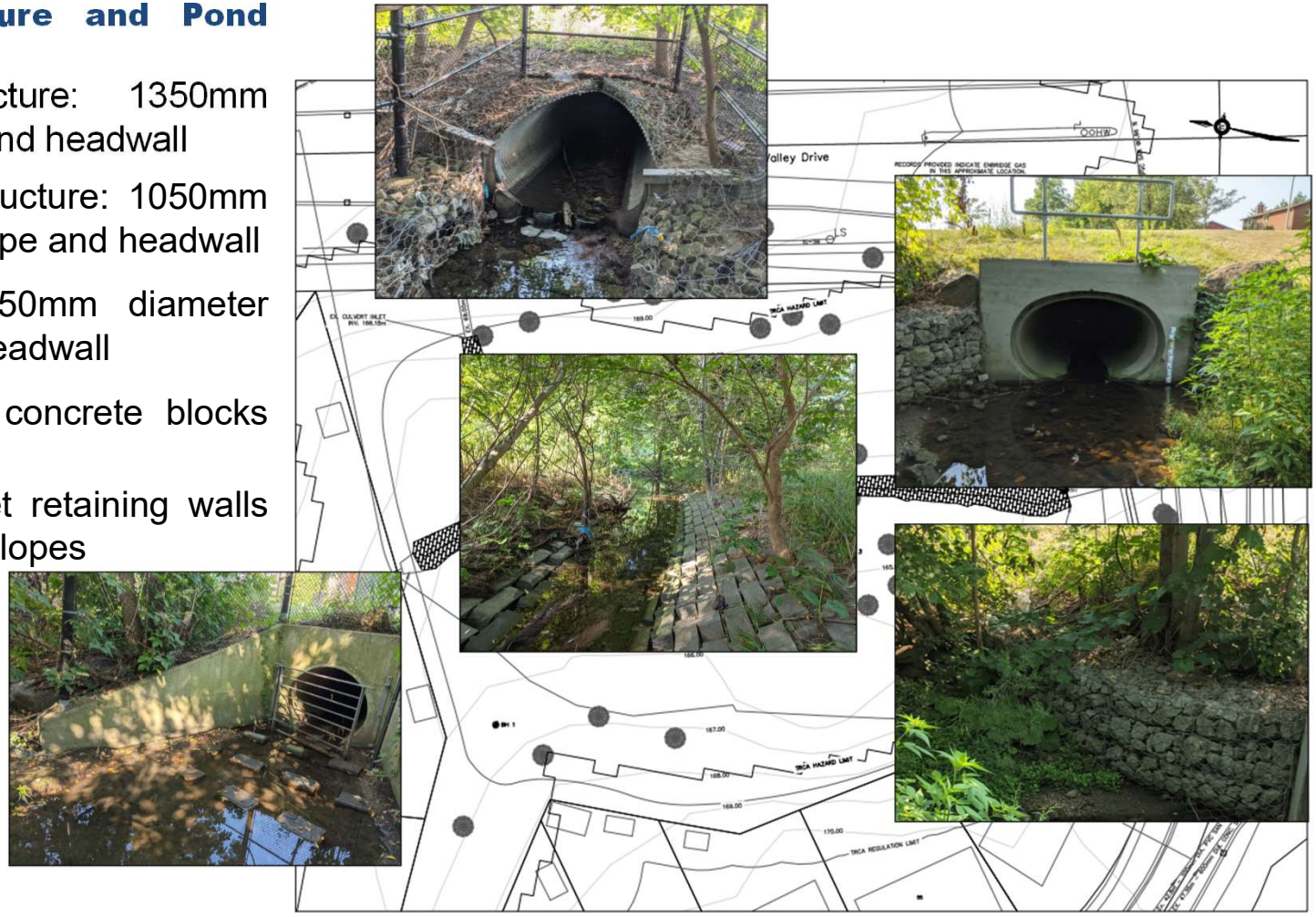
Typical Dry Pond Facility

Typical Wet Pond Facility

Existing Villa Park Pond Facility

Existing Infrastructure and Pond Features

- Creek Inlet Structure: 1350mm diameter CSP pipe and headwall
- Subdivision Inlet Structure: 1050mm diameter Concrete pipe and headwall
- Outlet Structure: 750mm diameter Concrete pipe and headwall
- Channel lined with concrete blocks interlocked
- Gabion stone basket retaining walls for stabilizing steep slopes



Existing Environmental Conditions

Key Findings

Biophysical Surveys

- 245 trees inventoried, 17 species were recorded as native and 7 as non-native species
- No noteworthy or significant habitat features
- Low number of very common species (American Robin, Common Racoon, Eastern Cottontail, Eastern Grey Squirrel) were noted
- The channelized and confined nature of the tributary offer little to no riparian habitat
- Fish habitat present in the immediate study area was highly fragmented and of low quality
- No SAR or Species of Conservation Concern (SOCC) were observed

Class EA

The preferred option under the EA will take into consideration the natural environmental features and functions of the surrounding area and will seek to avoid, minimize, and mitigate potential impacts to the ecological form and function of natural heritage features.

Evaluation Criteria

The following criteria will be used to evaluate each alternative. It will help determine which alternative should be selected as the Preliminary Preferred Alternative. The Final Preferred Alternative will be selected based on agency and public input.

Natural Environment

- Impact on existing terrestrial systems
- Impact on aquatic life and habitat (fish passage)
- Impact on aquatic life and habitat (temperature)
- Water quality benefit
- Potential to reduce downstream erosion and flooding

Technical

- Ease of implementation
- Agency acceptance
- Meets policy/by-law requirements
- Technical feasibility
- Ease of maintenance

Social/Cultural

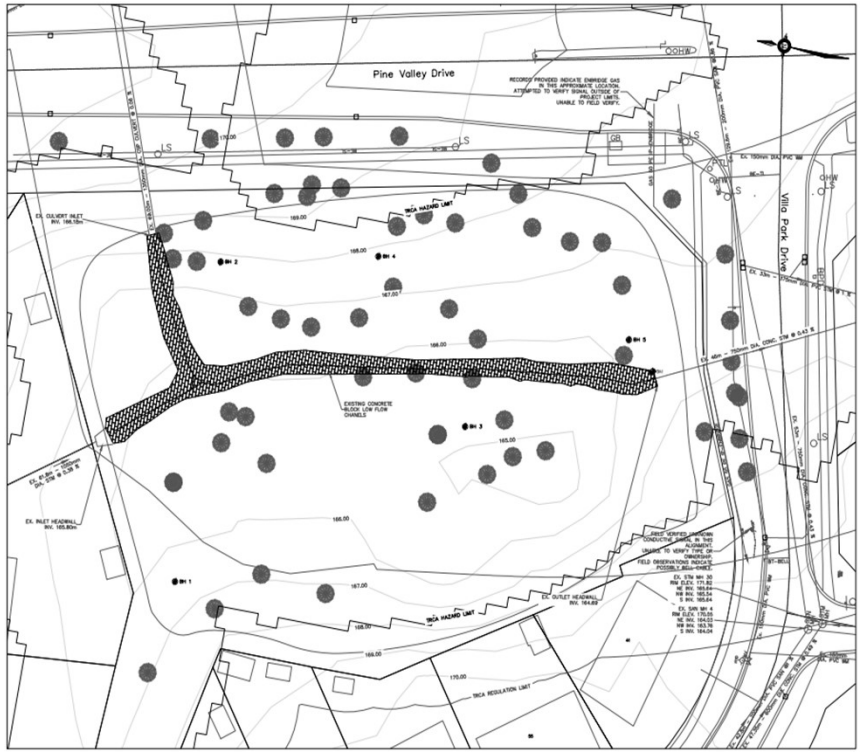
- Potential to provide health safety objectives
- Aesthetic/recreation benefits
- Compatibility with existing land-use
- Potential community disruption

Economic/Financial

- Capital construction costs
- Operation/Maintenance costs
- Protection of new/existing infrastructure

Alternative #1 – Existing Pond Remains Unchanged

Description:
This alternative is traditionally carried forward as a benchmark in the Environmental Assessment process. This would essentially equate to maintaining the existing Villa Park Pond facility as a dry pond. The facility would continue to receive runoff from the north inlet (29 hectare contributing area) as well as the northeast inlet (205 hectare area).



Opportunities	Drawbacks
• Low risk to public health and safety • Minimal disruptions	•No Water Quality Benefit •Inhibits fish passage •Negative effects on water temperatures •Not supportive of terrestrial systems
• Least costly to implement •Easy/inexpensive to maintain	• Does not meet planning policy •Will not receive DMAF funding •Does not protect existing infrastructure (sedimentation)

Approximate Capital Cost: No Cost
Maintenance/Operation Cost: Low

Alternative #2 – Off-Line Wet Pond and Creek Naturalization

Description:
The Villa Park Pond will be upgraded to include a wet pond with a separation berm installed between the proposed pond and the adjacent creek channel to disconnect inflows from the northeast inlet. The pond will remain off-line, with contributing flows from the north inlet receiving water quality benefits. The creek will be designed with substrate, riffles, pools, and vegetative buttresses to enhance the naturalization of the channel.

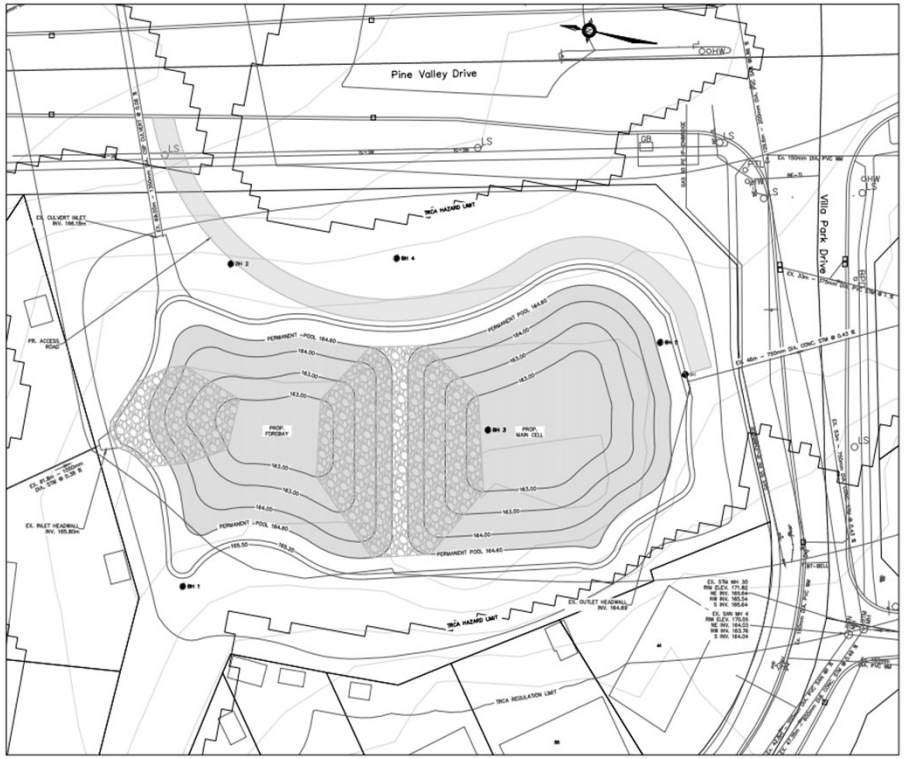
Opportunities	Drawbacks
• Enhances water quality •Reduces downstream flooding and erosion •Supportive of aquatic habitat	•Community/ Environmental disruptions during construction
• Applicable for DMAF funding •Improved protection for new/existing infrastructure •High acceptance from agencies •Meets planning policy	•Higher Capital Costs •Additional maintenance efforts/costs

Approximate Cost: $3.2 million
Operation/Maintenance Costs: Moderate

Alternative #3 – On-line Facility Configuration

Description:

This alternative involves upgrading the existing Villa Park Pond to include the design of a wet pond where the existing channel will be allowed to flow through the facility. The pond would therefore remain on-line, with flows from both the north and northeast outlets continuing to contribute to the facility.



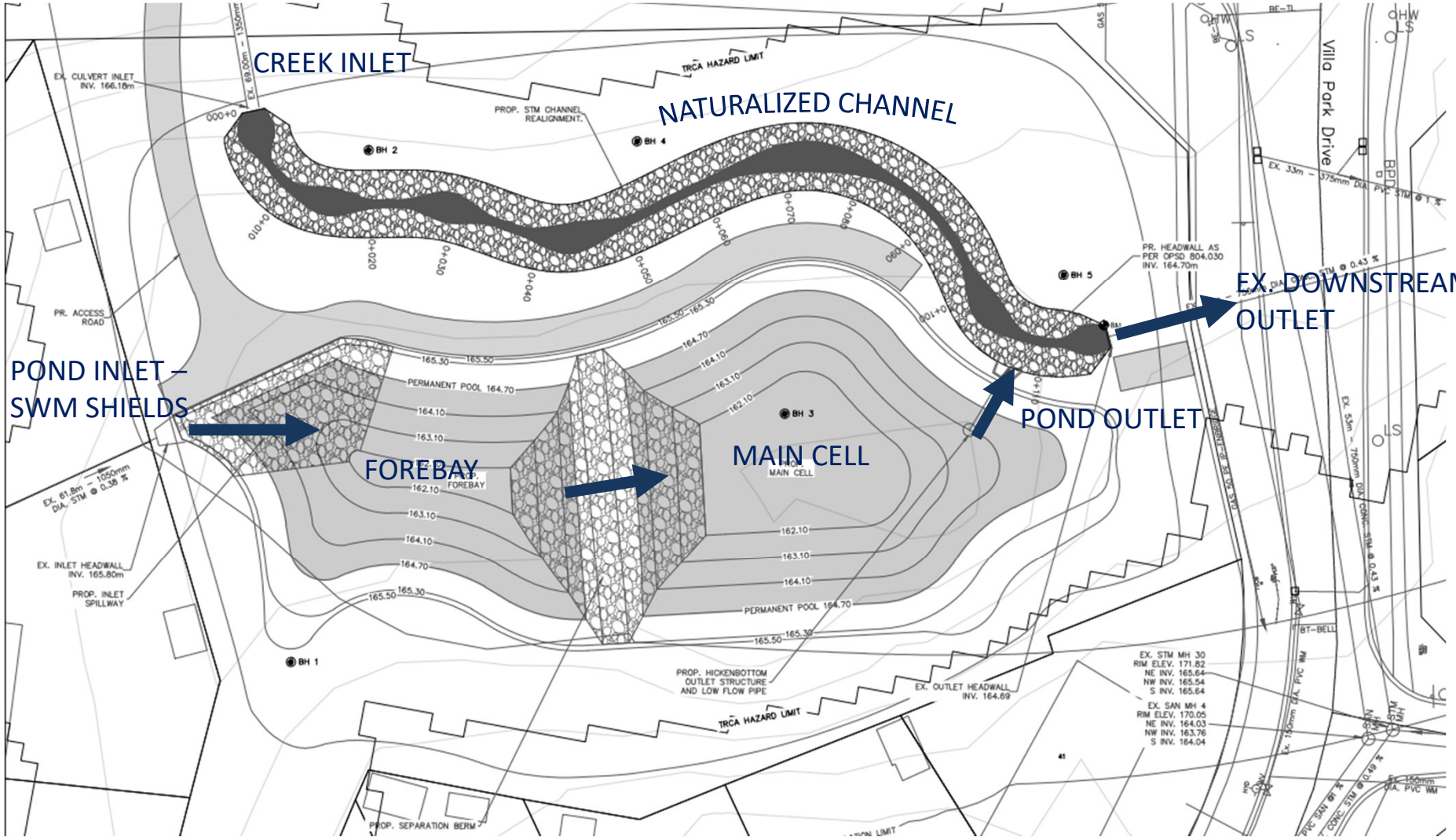
Opportunities	Drawbacks
• Reduces downstream flooding and erosion	• Limited water quality improvement •Limited to no improvement on water temperatures •Most disruptive to the environment/ community •Restricts fish habitat
• Applicable for DMAF funding	• Highest capital costs •Highest maintenance costs •Does not protect new/existing infrastructure (sedimentation)

Approximate Cost: $4.3 million
Operation/Maintenance Costs: High

Evaluation of Alternative

Evaluation Criteria	ALTERNATIVE #1	ALTERNATIVE #2	ALTERNATIVE #3
Physical/Natural Environment			
Potential Impact/Benefit on Existing Terrestrial Systems	2	4	3
Potential Aquatic Habitat Impact/Benefit (Fish Passage)	1	3	1
Potential Aquatic Habitat Impact/ Benefit (Temperature)	1	3	1
Potential Water Quality Benefit	1	4	1
Potential to Reduce Downstream Flooding and Erosion	1	4	4
Social/Cultural Environment			
Potential to Provide Public Health and Safety Objectives	4	3	1
Aesthetic / Recreation Benefits	1	4	1
Compatibility with Adjacent Land Use	4	4	1
Potential Community Disruption	4	3	1
Economic Environment			
Capital Construction Costs	4	2	1
Operation/Maintenance Costs	4	2	1
Protection of New/Existing Infrastructure	2	4	1
Technical/Engineering Considerations			
Ease of Implementation	4	3	1
Agency Acceptance	1	4	1
Meets Policy/Bylaw Requirements	1	4	2
Technical Feasibility	4	3	3
Ease of Maintenance	4	1	1
Total Score	43	55	24
4 = indicated that the retrofit design alternative score high in satisfying the respective design criteria **1 = indicated the retrofit design option scored low in relation to the criteria**			

Preferred Alternative: Off-line Pond and Creek Naturalization



Preferred Alternative: Design Elements

Basic Design Elements

- Creek Realignment
- Vegetated Buttress
- Pond Excavation (Forebay and Main cell)
- Installation of Headwalls/Retaining Structures

Preferred Alternative: Design Elements

Basic Design Elements

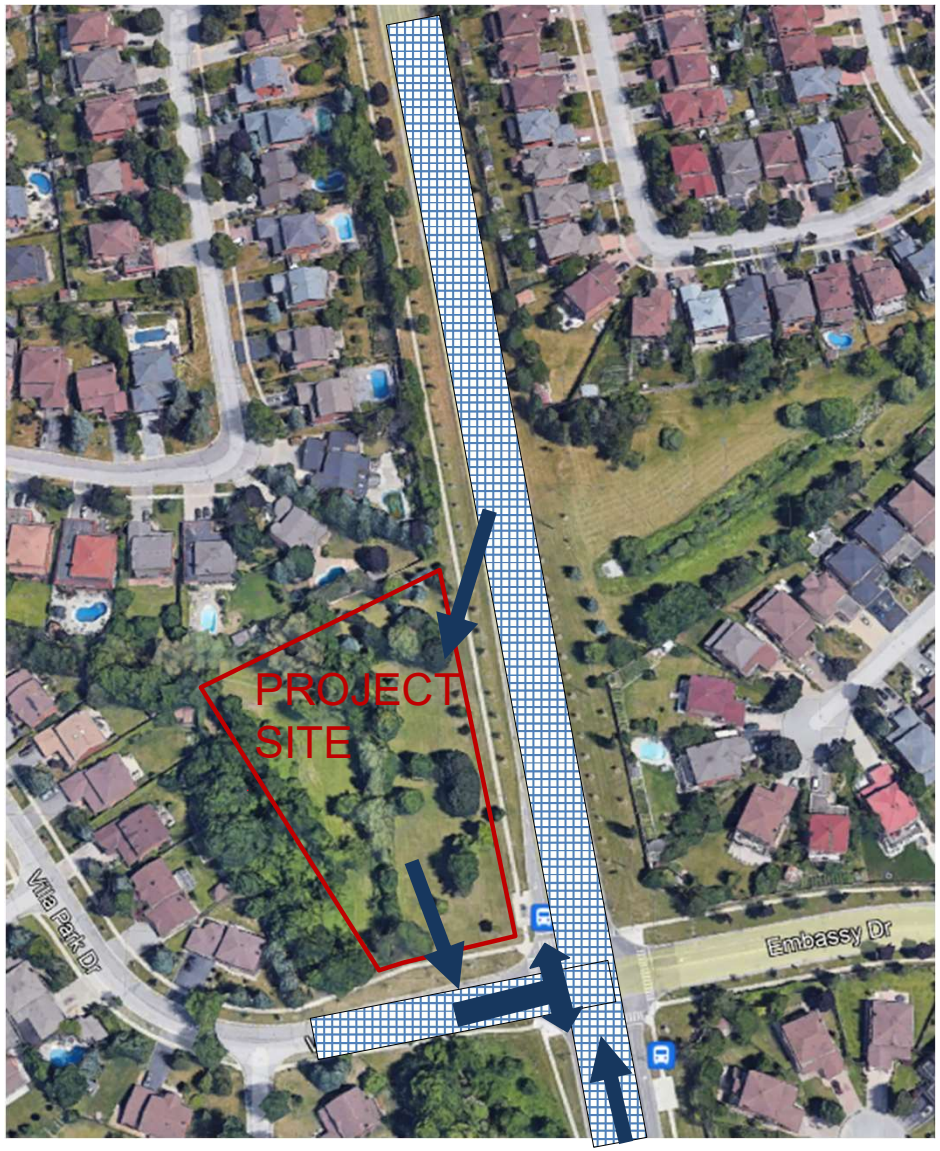
- SWM Shields
- Enhanced Landscaping/Plantings
- Hickenbottom/Bottom Draw Outlet Structure
- Maintenance Access

Construction Expectations

- **Noise, Mid Tracking, Dust, Vibrations**
- **Hauling 200-300 trucks per day during peak hauling times (4 weeks)**
- **Working Hours: M-F 7am – 7pm**
- **Pre-construction Inspection of Homes:**
  - Third Party inspection of home exterior and interior.
  - Used to confirm if possible damage is cause by construction (i.e. vibration)
  - Inspections are completed as permitted by homeowner
  - Completed for homes within close proximity to site.
- **Closure to sidewalks**

Construction Expectations

- Main Truck Access from Pine Valley Drive
- Removal of trees and vegetation
- Dewatering/Bypass Pumping
- Truck Staging may occur on Villa Park Drive
- Construction Work Limited to the Project Site



Next Steps and Contact Information

After this Public Information Centre, the study team will consider verbal and written comments in order to proceed with the selection of the preferred alternative.

A Questionnaire has been provided online and can be accessed to fill out comments and questions.

For more information on this project and to be placed on our mailing list, please contact:

Alan Manlucu, P. Eng.
Project Manager

City of Vaughan
2141 Major MacKenzie Dr.
Vaughan, ON L6A 1T1

T: (905) 832-8585 ext. 8468
Alan.manlucu@vaughan.ca

Dave Maunder, MSc., P. Eng.
Project Manager

Aquafor Beech Ltd
#6-202 2600 Skymark Avenue
Mississauga, ON L4W 5B2

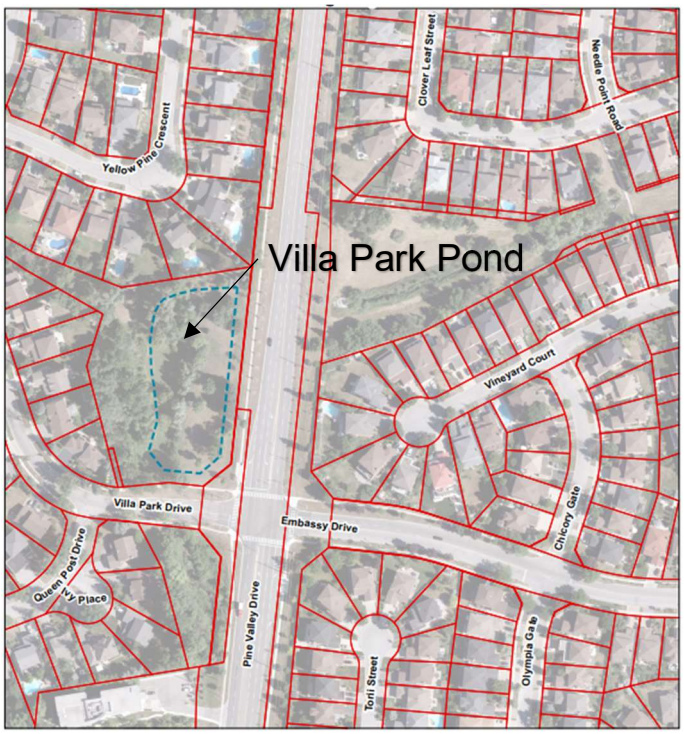
T: 905.629.0099 extension 290
maunder.d@aquaforbeech.com

Thank You for Participating

NOTICE OF COMPLETION
VILLA PARK POND RETROFIT STUDY AND CLASS ENVIRONMENTAL ASSESSMENT

THE STUDY

The City of Vaughan has completed a Municipal Class Environmental Assessment (EA) to determine the preferred alternative for enhancing water quality at the Villa Park Pond, and restoring the Jersey Creek channel. The study was conducted in accordance with the requirements for Schedule 'B' projects, as described in the Municipal Engineers Association *Municipal Class Environmental Assessment* document (as amended in 2011).



The recommended solution, as documented in the Study Report, includes upgrading the site from a dry pond facility to a wet pond facility, and naturalizing the portion of Jersey Creek that flows through the site. Collectively, the proposed works will enhance water quality in Jersey Creek, lower storm effluent temperatures contributing to the creek, improve fish passage and provide a net overall improvement to the natural environment.

PUBLIC REVIEW PERIOD

The Study was carried out following the requirements under the Municipal Class EA. The Project Report has been completed and has been placed on public record for a review period starting May 5th, 2022 and ending June 18th, 202. It will be available for review at:

Civic Centre Resource Library
2191 Major MacKenzie Drive
Vaughan, ON
L6A 4W2
Telephone: (905) 653-7323

Please contact the City Project Manager regarding disability accommodation requirements as soon as possible.

The report is also available online at: http://www.vaughan.ca/

PUBLIC COMMENT PROCESS

If, after reviewing the document, you have questions or concerns regarding this project, please contact the following City staff:

Alan Manlucu, P.Eng., Project Manager
City of Vaughan
2141 Major MacKenzie Dr.
Vaughan, ON L6A 1T1
Phone: (905) 832-8585 ext. 8468
Email: Alan.manlucu@vaughan.ca

If concerns regarding this project cannot be resolved in discussion with the City of Vaughan, a person or party may request that the Minister of the Environment make an order for the project to comply with Part II of the Environmental Assessment Act (referred to as a Part II Order), which addresses individual Environmental Assessments. The Minister must receive the request in writing by June 18, 2022 at the address below, and a copy must also be sent to the City contact. If no requests are received by this date the City will proceed with this project as outlined in the Project File Report.

Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

Minister of the Environment
135 St. Clair Avenue West, 12 Floor
Toronto, ON M4V 1P5

Issue Date: May 5th, 2022

City of Vaughan Infrastructure Delivery
Alan Manlucu, P.Eng.
Project Manager
2141 Major Mackenzie Dr.
Vaughan, Ontario
L6A 1T1

Councillor Julie Christine Bothwell
Alderville First Nation
PO BOX 46
Roseneath, ON
K0K2X0

cc: Erin Stratton (Aboriginal Consultation and Environmental Services – INFC)
Deborah Campbell (Aboriginal Consultation and Environmental Services – INFC)

Subject: Detailed Design, CA and Inspection of Stormwater Management Improvements at Various DMAF Funded Sites

Dear Councillor Julie Christine Bothwell:

I am writing to notify you that the City of Vaughan has been approved for financial support under Infrastructure Canada's (INFC) Disaster Mitigation and Adaptation Fund – to carry out retrofit projects to improve stormwater management in four (4) existing stormwater management facilities throughout the City. I am also writing to provide you with information on the proposed projects and the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Alderville First Nation may have about this project.

This project will involve the retrofit of three (3) existing dry ponds and the retrofit of one (1) existing outfall into a wetland located within the City of Vaughan, as described below:

1. SWMF 3 – Villa Park Pond:

   Villa Park Pond is presently a dry pond facility located north of Villa Park Drive, and west of Pine Valley Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to realign the existing watercourse (Jersey Creek) to maintain the facility off-line. The existing outlet structure and the access to the facility for inspection and maintenance purposes will also be updated.

2. SWMF 5 – Accumen Investments Pond:

   Accumen Investments Pond is also presently a dry pond facility, located east of Kaiser Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. The existing pond will be further excavated and converted into a Wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will provide water quality benefits, maintain existing flood control performance, and also improve access to the facility for inspection and maintenance purposes.

3. SWMF 8 - Harmonia Pond:

   Harmonia Pond is presently a dry pond facility located southeast of Harmonia Crescent, and northeast of Dunstan Crescent (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to the existing inlet and outlet structures and the access to the facility for inspection and maintenance purposes. An existing sanitary sewer that currently crosses the pond will be realigned to avoid the pond.

4. Location 12 – Ivory Ct/ Saddle Tree Crescent:

   Location 12 is an existing outfall located south of Langstaff Court, between Ivory Court and Saddle Tree Crescent (See Appendix 1). As part of the proposed works, a wetland area will be constructed to receive stormwater from the existing outfall, with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management. The implementation of the wetland area will require new inlet and outlet structures, and a naturalized access road will be installed to allow inspection and maintenance of the new facility.

Several field investigations were included as part of the design process to confirm and characterize existing site features, including topographic surveys, subsurface utility (SUE) investigations, geotechnical investigations, and natural heritage investigations.

Prior to proceeding with this project, we would like to know if you have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns with regard to the proposed project. Furthermore, should you require additional information on the proposed project, please contact Alan Manlucu, by telephone at 905-832-8585, ext 8468 or by email at Alan.Manlucu@vaughan.ca. I would appreciate hearing back from you by January 14, 2022. If it is not possible to respond within this timeframe, please kindly contact me to establish a mutually agreed-upon timeframe.

I would like to thank you in advance for your consideration of this request and look forward to hearing back from you.

Sincerely Yours,

Alan Manlucu, P.Eng
Project Manager
City of Vaughan

City of Vaughan Infrastructure Delivery
Alan Manlucu, P.Eng.
Project Manager
2141 Major Mackenzie Dr.
Vaughan, Ontario
L6A 1T1

Chief Guy Harlton Monague
Beausoleil First Nation
General Delivery
Cedar Point, ON
L0K1C0

cc: Erin Stratton (Aboriginal Consultation and Environmental Services – INFC)
Deborah Campbell (Aboriginal Consultation and Environmental Services – INFC)

Subject: Detailed Design, CA and Inspection of Stormwater Management Improvements at Various DMAF Funded Sites

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Dear Chief Guy Harlton Monague :

I am writing to notify you that the City of Vaughan has been approved for financial support under Infrastructure Canada's (INFC) Disaster Mitigation and Adaptation Fund – to carry out retrofit projects to improve stormwater management in four (4) existing stormwater management facilities throughout the City. I am also writing to provide you with information on the proposed projects and the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Beausoleil First Nation may have about this project.
This project will involve the retrofit of three (3) existing dry ponds and the retrofit of one (1) existing outfall into a wetland located within the City of Vaughan, as described below:

1. SWMF 3 – Villa Park Pond:

   Villa Park Pond is presently a dry pond facility located north of Villa Park Drive, and west of Pine Valley Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to realign the existing watercourse (Jersey Creek) to maintain the facility off-line. The existing outlet structure and the access to the facility for inspection and maintenance purposes will also be updated.

2. SWMF 5 – Accumen Investments Pond:

   Accumen Investments Pond is also presently a dry pond facility, located east of Kaiser Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. The existing pond will be further excavated and converted into a Wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will provide water quality benefits, maintain existing flood control performance, and also improve access to the facility for inspection and maintenance purposes.

3. SWMF 8 - Harmonia Pond:

   Harmonia Pond is presently a dry pond facility located southeast of Harmonia Crescent, and northeast of Dunstan Crescent (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to the existing inlet and outlet structures and the access to the facility for inspection and maintenance purposes. An existing sanitary sewer that currently crosses the pond will be realigned to avoid the pond.

4. Location 12 – Ivory Ct/ Saddle Tree Crescent:

   Location 12 is an existing outfall located south of Langstaff Court, between Ivory Court and Saddle Tree Crescent (See Appendix 1). As part of the proposed works, a wetland area will be constructed to receive stormwater from the existing outfall, with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management. The implementation of the wetland area will require new inlet and outlet structures, and a naturalized access road will be installed to allow inspection and maintenance of the new facility.

Several field investigations were included as part of the design process to confirm and characterize existing site features, including topographic surveys, subsurface utility (SUE) investigations, geotechnical investigations, and natural heritage investigations.

Prior to proceeding with this project, we would like to know if you have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns with regard to the proposed project. Furthermore, should you require additional information on the proposed project, please contact Alan Manlucu, by telephone at 905-832-8585, ext 8468 or by email at Alan.Manlucu@vaughan.ca. I would appreciate hearing back from you by January 14, 2022. If it is not possible to respond within this timeframe, please kindly contact me to establish a mutually agreed-upon timeframe.

I would like to thank you in advance for your consideration of this request and look forward to hearing back from you.

Sincerely Yours,

Alan Manlucu, P.Eng
Project Manager
City of Vaughan

City of Vaughan Infrastructure Delivery
Alan Manlucu, P.Eng.
Project Manager
2141 Major Mackenzie Dr.
Vaughan, Ontario
L6A 1T1

Chief Donna Big Canoe
Chippewas of Georgina Island
RR2, PO Box 13
Sutton West, ON
L0E1R0

cc: Erin Stratton (Aboriginal Consultation and Environmental Services – INFC)
Deborah Campbell (Aboriginal Consultation and Environmental Services – INFC)

Subject: Detailed Design, CA and Inspection of Stormwater Management Improvements at Various DMAF Funded Sites

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Dear Chief Donna Big Canoe :

I am writing to notify you that the City of Vaughan has been approved for financial support under Infrastructure Canada's (INFC) Disaster Mitigation and Adaptation Fund – to carry out retrofit projects to improve stormwater management in four (4) existing stormwater management facilities throughout the City. I am also writing to provide you with information on the proposed projects and the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Chippewas of Georgina Island may have about this project.

This project will involve the retrofit of three (3) existing dry ponds and the retrofit of one (1) existing outfall into a wetland located within the City of Vaughan, as described below:

1. SWMF 3 – Villa Park Pond:

   Villa Park Pond is presently a dry pond facility located north of Villa Park Drive, and west of Pine Valley Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to realign the existing watercourse (Jersey Creek) to maintain the facility off-line. The existing outlet structure and the access to the facility for inspection and maintenance purposes will also be updated.

2. SWMF 5 – Accumen Investments Pond:

   Accumen Investments Pond is also presently a dry pond facility, located east of Kaiser Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. The existing pond will be further excavated and converted into a Wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will provide water quality benefits, maintain existing flood control performance, and also improve access to the facility for inspection and maintenance purposes.

3. SWMF 8 - Harmonia Pond:

   Harmonia Pond is presently a dry pond facility located southeast of Harmonia Crescent, and northeast of Dunstan Crescent (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to the existing inlet and outlet structures and the access to the facility for inspection and maintenance purposes. An existing sanitary sewer that currently crosses the pond will be realigned to avoid the pond.

4. Location 12 – Ivory Ct/ Saddle Tree Crescent:

   Location 12 is an existing outfall located south of Langstaff Court, between Ivory Court and Saddle Tree Crescent (See Appendix 1). As part of the proposed works, a wetland area will be constructed to receive stormwater from the existing outfall, with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management. The implementation of the wetland area will require new inlet and outlet structures, and a naturalized access road will be installed to allow inspection and maintenance of the new facility.

Several field investigations were included as part of the design process to confirm and characterize existing site features, including topographic surveys, subsurface utility (SUE) investigations, geotechnical investigations, and natural heritage investigations.

Prior to proceeding with this project, we would like to know if you have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns with regard to the proposed project. Furthermore, should you require additional information on the proposed project, please contact Alan Manlucu, by telephone at 905-832-8585, ext 8468 or by email at Alan.Manlucu@vaughan.ca. I would appreciate hearing back from you by January 14, 2022. If it is not possible to respond within this timeframe, please kindly contact me to establish a mutually agreed-upon timeframe.

I would like to thank you in advance for your consideration of this request and look forward to hearing back from you.

Sincerely Yours,

Alan Manlucu, P.Eng
Project Manager
City of Vaughan

City of Vaughan Infrastructure Delivery
Alan Manlucu, P.Eng.
Project Manager
2141 Major Mackenzie Dr.
Vaughan, Ontario
L6A 1T1

Chief Rodney Noganosh
Chippewas of Rama First Nation
200-5884 Rama Road
Rama, ON
L3V6H6

cc: Erin Stratton (Aboriginal Consultation and Environmental Services – INFC)
Deborah Campbell (Aboriginal Consultation and Environmental Services – INFC)

Subject: Detailed Design, CA and Inspection of Stormwater Management Improvements at Various DMAF Funded Sites

Dear Chief Rodney Noganosh:

I am writing to notify you that the City of Vaughan has been approved for financial support under Infrastructure Canada's (INFC) Disaster Mitigation and Adaptation Fund – to carry out retrofit projects to improve stormwater management in four (4) existing stormwater management facilities throughout the City. I am also writing to provide you with information on the proposed projects and the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Chippewas of Rama First Nation may have about this project.

This project will involve the retrofit of three (3) existing dry ponds and the retrofit of one (1) existing outfall into a wetland located within the City of Vaughan, as described below:

1. SWMF 3 – Villa Park Pond:

   Villa Park Pond is presently a dry pond facility located north of Villa Park Drive, and west of Pine Valley Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to realign the existing watercourse (Jersey Creek) to maintain the facility off-line. The existing outlet structure and the access to the facility for inspection and maintenance purposes will also be updated.

2. SWMF 5 – Accumen Investments Pond:

   Accumen Investments Pond is also presently a dry pond facility, located east of Kaiser Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. The existing pond will be further excavated and converted into a Wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will provide water quality benefits, maintain existing flood control performance, and also improve access to the facility for inspection and maintenance purposes.

3. SWMF 8 - Harmonia Pond:

   Harmonia Pond is presently a dry pond facility located southeast of Harmonia Crescent, and northeast of Dunstan Crescent (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to the existing inlet and outlet structures and the access to the facility for inspection and maintenance purposes. An existing sanitary sewer that currently crosses the pond will be realigned to avoid the pond.

4. Location 12 – Ivory Ct/ Saddle Tree Crescent:

   Location 12 is an existing outfall located south of Langstaff Court, between Ivory Court and Saddle Tree Crescent (See Appendix 1). As part of the proposed works, a wetland area will be constructed to receive stormwater from the existing outfall, with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management. The implementation of the wetland area will require new inlet and outlet structures, and a naturalized access road will be installed to allow inspection and maintenance of the new facility.

Several field investigations were included as part of the design process to confirm and characterize existing site features, including topographic surveys, subsurface utility (SUE) investigations, geotechnical investigations, and natural heritage investigations.

Prior to proceeding with this project, we would like to know if you have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns with regard to the proposed project. Furthermore, should you require additional information on the proposed project, please contact Alan Manlucu, by telephone at 905-832-8585, ext 8468 or by email at Alan.Manlucu@vaughan.ca. I would appreciate hearing back from you by January 14, 2022. If it is not possible to respond within this timeframe, please kindly contact me to establish a mutually agreed-upon timeframe.

I would like to thank you in advance for your consideration of this request and look forward to hearing back from you.

Sincerely Yours,

Alan Manlucu, P.Eng
Project Manager
City of Vaughan

City of Vaughan Infrastructure Delivery
Alan Manlucu, P.Eng.
Project Manager
2141 Major Mackenzie Dr.
Vaughan, Ontario
L6A 1T1

Chief Phyllis Williams
Curve Lake First Nation
General Delivery
Curve Lake, ON
K0L1R0

cc: Erin Stratton (Aboriginal Consultation and Environmental Services – INFC)
Deborah Campbell (Aboriginal Consultation and Environmental Services – INFC)

Subject: Detailed Design, CA and Inspection of Stormwater Management Improvements at Various DMAF Funded Sites

Dear Chief Phyllis Williams:

I am writing to notify you that the City of Vaughan has been approved for financial support under Infrastructure Canada's (INFC) Disaster Mitigation and Adaptation Fund – to carry out retrofit projects to improve stormwater management in four (4) existing stormwater management facilities throughout the City. I am also writing to provide you with information on the proposed projects and the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Curve Lake First Nation may have about this project.

This project will involve the retrofit of three (3) existing dry ponds and the retrofit of one (1) existing outfall into a wetland located within the City of Vaughan, as described below:

1. SWMF 3 – Villa Park Pond:

   Villa Park Pond is presently a dry pond facility located north of Villa Park Drive, and west of Pine Valley Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to realign the existing watercourse (Jersey Creek) to maintain the facility off-line. The existing outlet structure and the access to the facility for inspection and maintenance purposes will also be updated.

2. SWMF 5 – Accumen Investments Pond:

   Accumen Investments Pond is also presently a dry pond facility, located east of Kaiser Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. The existing pond will be further excavated and converted into a Wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will provide water quality benefits, maintain existing flood control performance, and also improve access to the facility for inspection and maintenance purposes.

3. SWMF 8 - Harmonia Pond:

   Harmonia Pond is presently a dry pond facility located southeast of Harmonia Crescent, and northeast of Dunstan Crescent (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to the existing inlet and outlet structures and the access to the facility for inspection and maintenance purposes. An existing sanitary sewer that currently crosses the pond will be realigned to avoid the pond.

4. Location 12 – Ivory Ct/ Saddle Tree Crescent:

   Location 12 is an existing outfall located south of Langstaff Court, between Ivory Court and Saddle Tree Crescent (See Appendix 1). As part of the proposed works, a wetland area will be constructed to receive stormwater from the existing outfall, with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management. The implementation of the wetland area will require new inlet and outlet structures, and a naturalized access road will be installed to allow inspection and maintenance of the new facility.

Several field investigations were included as part of the design process to confirm and characterize existing site features, including topographic surveys, subsurface utility (SUE) investigations, geotechnical investigations, and natural heritage investigations.

Prior to proceeding with this project, we would like to know if you have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns with regard to the proposed project. Furthermore, should you require additional information on the proposed project, please contact Alan Manlucu, by telephone at 905-832-8585, ext 8468 or by email at Alan.Manlucu@vaughan.ca. I would appreciate hearing back from you by January 14, 2022. If it is not possible to respond within this timeframe, please kindly contact me to establish a mutually agreed-upon timeframe.

I would like to thank you in advance for your consideration of this request and look forward to hearing back from you.

Sincerely Yours,

Alan Manlucu, P.Eng
Project Manager
City of Vaughan

City of Vaughan Infrastructure Delivery
Alan Manlucu, P.Eng.
Project Manager
2141 Major Mackenzie Dr.
Vaughan, Ontario
L6A 1T1

Chief Laurie Marie Carr
Hiawatha First Nation
RR 2
Keene, ON
K0L2G0

cc: Erin Stratton (Aboriginal Consultation and Environmental Services – INFC)
Deborah Campbell (Aboriginal Consultation and Environmental Services – INFC)

Subject: Detailed Design, CA and Inspection of Stormwater Management Improvements at Various DMAF Funded Sites

Dear Chief Laurie Marie Carr :

I am writing to notify you that the City of Vaughan has been approved for financial support under Infrastructure Canada's (INFC) Disaster Mitigation and Adaptation Fund – to carry out retrofit projects to improve stormwater management in four (4) existing stormwater management facilities throughout the City. I am also writing to provide you with information on the proposed projects and the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Hiawatha First Nation may have about this project.

This project will involve the retrofit of three (3) existing dry ponds and the retrofit of one (1) existing outfall into a wetland located within the City of Vaughan, as described below:

1. SWMF 3 – Villa Park Pond:

   Villa Park Pond is presently a dry pond facility located north of Villa Park Drive, and west of Pine Valley Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to realign the existing watercourse (Jersey Creek) to maintain the facility off-line. The existing outlet structure and the access to the facility for inspection and maintenance purposes will also be updated.

2. SWMF 5 – Accumen Investments Pond:

   Accumen Investments Pond is also presently a dry pond facility, located east of Kaiser Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. The existing pond will be further excavated and converted into a Wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will provide water quality benefits, maintain existing flood control performance, and also improve access to the facility for inspection and maintenance purposes.

3. SWMF 8 - Harmonia Pond:

   Harmonia Pond is presently a dry pond facility located southeast of Harmonia Crescent, and northeast of Dunstan Crescent (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to the existing inlet and outlet structures and the access to the facility for inspection and maintenance purposes. An existing sanitary sewer that currently crosses the pond will be realigned to avoid the pond.

4. Location 12 – Ivory Ct/ Saddle Tree Crescent:

   Location 12 is an existing outfall located south of Langstaff Court, between Ivory Court and Saddle Tree Crescent (See Appendix 1). As part of the proposed works, a wetland area will be constructed to receive stormwater from the existing outfall, with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management. The implementation of the wetland area will require new inlet and outlet structures, and a naturalized access road will be installed to allow inspection and maintenance of the new facility.

Several field investigations were included as part of the design process to confirm and characterize existing site features, including topographic surveys, subsurface utility (SUE) investigations, geotechnical investigations, and natural heritage investigations.

Prior to proceeding with this project, we would like to know if you have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns with regard to the proposed project. Furthermore, should you require additional information on the proposed project, please contact Alan Manlucu, by telephone at 905-832-8585, ext 8468 or by email at Alan.Manlucu@vaughan.ca. I would appreciate hearing back from you by January 14, 2022. If it is not possible to respond within this timeframe, please kindly contact me to establish a mutually agreed-upon timeframe.

I would like to thank you in advance for your consideration of this request and look forward to hearing back from you.

Sincerely Yours,

Alan Manlucu, P.Eng
Project Manager
City of Vaughan

City of Vaughan Infrastructure Delivery
Alan Manlucu, P.Eng.
Project Manager
2141 Major Mackenzie Dr.
Vaughan, Ontario
L6A 1T1

Chief Stacey Laforme
Mississaugas of the Credit
2789 Mississauga Road, RR 6
Hagersville, ON
N0A1H0

cc: Erin Stratton (Aboriginal Consultation and Environmental Services – INFC)
Deborah Campbell (Aboriginal Consultation and Environmental Services – INFC)

Subject: Detailed Design, CA and Inspection of Stormwater Management Improvements at Various DMAF Funded Sites

Dear Chief Stacey Laforme:

I am writing to notify you that the City of Vaughan has been approved for financial support under Infrastructure Canada's (INFC) Disaster Mitigation and Adaptation Fund – to carry out retrofit projects to improve stormwater management in four (4) existing stormwater management facilities throughout the City. I am also writing to provide you with information on the proposed projects and the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Mississaugas of the Credit may have about this project.

This project will involve the retrofit of three (3) existing dry ponds and the retrofit of one (1) existing outfall into a wetland located within the City of Vaughan, as described below:

1. SWMF 3 – Villa Park Pond:

   Villa Park Pond is presently a dry pond facility located north of Villa Park Drive, and west of Pine Valley Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to realign the existing watercourse (Jersey Creek) to maintain the facility off-line. The existing outlet structure and the access to the facility for inspection and maintenance purposes will also be updated.

2. SWMF 5 – Accumen Investments Pond:

   Accumen Investments Pond is also presently a dry pond facility, located east of Kaiser Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. The existing pond will be further excavated and converted into a Wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will provide water quality benefits, maintain existing flood control performance, and also improve access to the facility for inspection and maintenance purposes.

3. SWMF 8 - Harmonia Pond:

   Harmonia Pond is presently a dry pond facility located southeast of Harmonia Crescent, and northeast of Dunstan Crescent (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to the existing inlet and outlet structures and the access to the facility for inspection and maintenance purposes. An existing sanitary sewer that currently crosses the pond will be realigned to avoid the pond.

4. Location 12 – Ivory Ct/ Saddle Tree Crescent:

   Location 12 is an existing outfall located south of Langstaff Court, between Ivory Court and Saddle Tree Crescent (See Appendix 1). As part of the proposed works, a wetland area will be constructed to receive stormwater from the existing outfall, with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management. The implementation of the wetland area will require new inlet and outlet structures, and a naturalized access road will be installed to allow inspection and maintenance of the new facility.

Several field investigations were included as part of the design process to confirm and characterize existing site features, including topographic surveys, subsurface utility (SUE) investigations, geotechnical investigations, and natural heritage investigations.

Prior to proceeding with this project, we would like to know if you have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns with regard to the proposed project. Furthermore, should you require additional information on the proposed project, please contact Alan Manlucu, by telephone at 905-832-8585, ext 8468 or by email at Alan.Manlucu@vaughan.ca. I would appreciate hearing back from you by January 14, 2022. If it is not possible to respond within this timeframe, please kindly contact me to establish a mutually agreed-upon timeframe.

I would like to thank you in advance for your consideration of this request and look forward to hearing back from you.

Sincerely Yours,

Alan Manlucu, P.Eng
Project Manager
City of Vaughan

City of Vaughan Infrastructure Delivery
Alan Manlucu, P.Eng.
Project Manager
2141 Major Mackenzie Dr.
Vaughan, Ontario
L6A 1T1

Chief Kelly Fay Larocca
Mississaugas of Scugog Island First Nation
22521 Island Road
Port Perry, ON
L9L1B6

cc: Erin Stratton (Aboriginal Consultation and Environmental Services – INFC)
Deborah Campbell (Aboriginal Consultation and Environmental Services – INFC)

Subject: Detailed Design, CA and Inspection of Stormwater Management Improvements at Various DMAF Funded Sites

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Dear Chief Kelly Fay Larocca:

I am writing to notify you that the City of Vaughan has been approved for financial support under Infrastructure Canada's (INFC) Disaster Mitigation and Adaptation Fund – to carry out retrofit projects to improve stormwater management in four (4) existing stormwater management facilities throughout the City. I am also writing to provide you with information on the proposed projects and the opportunity to convey any issues or concerns regarding possible impacts to Aboriginal rights or title or any other concerns that the Mississaugas of Scugog Island First Nation may have about this project.

This project will involve the retrofit of three (3) existing dry ponds and the retrofit of one (1) existing outfall into a wetland located within the City of Vaughan, as described below:

1. SWMF 3 – Villa Park Pond:

   Villa Park Pond is presently a dry pond facility located north of Villa Park Drive, and west of Pine Valley Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to realign the existing watercourse (Jersey Creek) to maintain the facility off-line. The existing outlet structure and the access to the facility for inspection and maintenance purposes will also be updated.

2. SWMF 5 – Accumen Investments Pond:

   Accumen Investments Pond is also presently a dry pond facility, located east of Kaiser Drive (see Appendix 1). The facility provides flood control for the contributing catchment area. The existing pond will be further excavated and converted into a Wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will provide water quality benefits, maintain existing flood control performance, and also improve access to the facility for inspection and maintenance purposes.

3. SWMF 8 - Harmonia Pond:

   Harmonia Pond is presently a dry pond facility located southeast of Harmonia Crescent, and northeast of Dunstan Crescent (see Appendix 1). The facility provides flood control for the contributing catchment area. As part of the proposed works, the existing pond will be further excavated and converted into a wet Pond with the addition of a permanent pool, while maintaining the existing facility footprint. The proposed design will add water quality benefits to the overall stormwater management in the facility while maintaining existing flood control performance. Additionally, improvements are also being proposed to the existing inlet and outlet structures and the access to the facility for inspection and maintenance purposes. An existing sanitary sewer that currently crosses the pond will be realigned to avoid the pond.

4. Location 12 – Ivory Ct/ Saddle Tree Crescent:

   Location 12 is an existing outfall located south of Langstaff Court, between Ivory Court and Saddle Tree Crescent (See Appendix 1). As part of the proposed works, a wetland area will be constructed to receive stormwater from the existing outfall, with the addition of a permanent pool. The proposed design will add water quality benefits to the overall stormwater management. The implementation of the wetland area will require new inlet and outlet structures, and a naturalized access road will be installed to allow inspection and maintenance of the new facility.

Several field investigations were included as part of the design process to confirm and characterize existing site features, including topographic surveys, subsurface utility (SUE) investigations, geotechnical investigations, and natural heritage investigations.

Prior to proceeding with this project, we would like to know if you have any questions or concerns regarding impacts to Aboriginal rights or title or if there are any other concerns with regard to the proposed project. Furthermore, should you require additional information on the proposed project, please contact Alan Manlucu, by telephone at 905-832-8585, ext 8468 or by email at Alan.Manlucu@vaughan.ca. I would appreciate hearing back from you by January 14, 2022. If it is not possible to respond within this timeframe, please kindly contact me to establish a mutually agreed-upon timeframe.

I would like to thank you in advance for your consideration of this request and look forward to hearing back from you.

Sincerely Yours,

Alan Manlucu, P.Eng
Project Manager
City of Vaughan

Jersey Creek – Villa Park Pond Retrofit

Environmental Assessment and Conceptual Design

Appendix D

Geotechnical Study

Englobe
Soils Materials Environment

Aquafor Beech Limited

STORMWATER MANAGEMENT IMPROVEMENTS SITE 3, VILLA PARK POND CITY OF VAUGHAN, ONTARIO

GEOTECHNICAL INVESTIGATION REPORT

October 26, 2021

OC01-02101989.000-03-GE-R-001-0A

DRAFT VERSION

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Client

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Revision and Publication Register		
Revision N°	**Date**	**Modification and/or Publication Details**
0A	2021-10-26	Draft Report

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Tables

Appendices

1 INTRODUCTION

Englobe Corp. (Englobe) was retained by Aquafor Beech Limited to conduct a geotechnical investigation in support of the detailed design phase for Various Stormwater Management (SWM) improvements as part of the federal Disaster Mitigation Adaption Fund (DMAF) for over 30 stormwater improvement in the City of Vaughan. The purpose of the geotechnical investigation is to determine the subsurface conditions at the borehole locations and provide engineering recommendations for the design and construction of the Ponds and associate structures.

This report contains the findings from the field investigation, engineering interpretation and recommendations for Site 3, Pond 87 (Villa Park Pond) located at Pine Valley and Villa Park Drive and address the geotechnical aspects of the site. The hydrogeological study and environmental assessment of the site will be reported separately.

A Site Plan showing the location of the Site as well as borehole locations is presented in Appendix 1 of this Report.

2 PROJECT METHODOLOGY

2.1 FIELD INVESTIGATION

Subsequent to obtaining public and private service clearances, five (5) boreholes (BH1 to BH5) were drilled to a depth of 5.2 metres below ground surface (mbgs) as indicated in the attached borehole logs in Appendix 2. Three (3) boreholes (BH1, BH4 and BH5) were equipped with 50 mm diameter monitoring wells. The boreholes were completed on August 9, 2021, using continuous flight solid stem auger drilling equipment supplied and operated by Drilltech Drilling Limited under the continuous supervision of an Englobe field technician.

Subsoil samples were recovered from the boreholes at depth intervals of 0.76 m up to 3.0 mbgs and 1.5 m interval below 3.0 mbgs using a 50 mm O.D. split-barrel sampler driven into the subsoil in accordance with the Standard Penetration Test procedure (ASTM D1586). The recovered subsoil samples were visually examined in the field and then preserved and transported to the Englobe Toronto laboratory for examination and testing.

Groundwater observations were carried out in the open boreholes upon completion of the field work and in the installed monitoring wells in BH1, BH4 and BH5.

The borehole locations were surveyed by Englobe using Sokkia GRX2 GNSS Receiver GPS connected to MAGNET Enterprise network referenced to UTM Zone 17T (NAD83). The surface elevations at the borehole locations were referenced to a site Benchmark located at the existing culvert, with a geodetic elevation of 166.393 m, provided by Aquafor Beech. The survey results are presented in the attached Borehole Logs in Appendix 2. The information of the drilled boreholes is summarized in table 1.

Table 1 Summary of Borehole Information

BH NO	NORTHING	EASTING	ELEVATION (m)	DEPTH OF BOREHOLE (m)	DEPTH OF MONITORING WELL (m)
BH1	4849482.36	614589.84	166.38	5.2	4.5
BH2	4849483.99	614658.83	167.46	5.2	N/A
BH3	4849431.05	614637.41	165.46	5.2	N/A
BH4	4849454.15	614665.74	167.45	5.2	4.5
BH5	4849402.55	614659.26	166.12	5.2	4.5

2.2 GEOTECHNICAL LABORATORY TESTS

Soil samples recovered during this investigation were preserved and transported to the Englobe Toronto laboratory for additional testing. In the laboratory, each soil sample was examined as to its visual and textural characteristics by the Project Engineer. Moisture content determinations were carried out on all subgrade soil samples. The results are plotted on the borehole logs attached in Appendix 2

Three (3) Gradation tests (sieve/hydrometer) were performed on selected soil samples. The geotechnical laboratory results are provided in Appendix 3 as well as presented on the respective borehole logs provided in Appendix 2.

3 SITE AND SUBSURFACE CONDITIONS

The Site is located at the west side of Pine Valley Drive and north side of Villa Park Drive. The subject site is currently a vacant land with residential properties at the north and west side. An engineered channel runs from north to south with inlets at the north and north-east end, outlet at the south end.

The borehole location plan is shown on drawing presented in Appendix 1. The subsurface conditions are presented in the individual borehole logs in Appendix 2 and summarized in the following sections.

3.1 SOIL CONDITIONS

In general, the soils encountered underneath the topsoil and fill material consist of clayey silt to silty clay, with interbedded, overlain, or underlain sandy silt to silty sand deposit in some boreholes.

Topsoil: A surficial topsoil layer varying from 75 to 125 mm in thickness was observed in all boreholes as indicated in the Borehole Logs.

It should be noted that the thickness of the topsoil explored at the borehole location may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site.

Fill: Fill material consisting of sandy silt and clayey silt was observed in all boreholes and extended to depth ranging from 0.8 to 2.1 mbgs. The compactness of the fill is generally loose to compact (soft to firm for clayey silt) and the in-situ moisture content of this material ranged from 7 to 28 percent.

Clayey Silt to Silty Clay: clayey silt/silty clay deposit was observed in all boreholes underneath the fill material and below a layer of sandy silt in BH4, extending to depth of 3.0 mbgs in BH5 and to the maximum explored depth in other boreholes. The clayey silt/silty clay deposit was generally presented in a firm to very stiff consistency, having SPT 'N'-value ranging from 4 to 20 blows per 300 mm of penetration. The in-situ moisture content of this deposit ranged from 12 to 19 percent.

Grain size analysis of one (1) clayey silt/silty clay sample was carried out and the result is presented in Appendix 3 of this report. A summary of testing for this material is briefly outlined in Table 2.

Table 2 Laboratory Tests Results (Silty Clauy0

BOREHOLE NO.	SAMPLE NO.	GRAIN SIZE DISTRIBUTION ANALYSES (%)			
		GRAVEL	SAND	SILT	CLAY
BH1	SS5	1	20	48	31

Sandy Silt/Silty Sand: Sandy silt/silty sand deposit was encountered underneath the fill material in BH4 and below the clayey silt/silty clay in BH5. A layer of sandy silt was also encountered in BH1 interbedded within the clayey silt deposit. The sandy silt/silty sand deposit was generally presented in a compact state, having SPT 'N'-value ranging from 11 to 26 blows per 300 mm of penetration. The in-situ moisture content of this deposit ranged from 12 to 24 percent.

Grain size analyses on two (2) selected sandy silt/silty sand samples were carried out and the results are presented in Appendix 3 of this report. A summary of testing for this material is briefly outlined in Table 3.

Table 3 Laboratory Tests Results (Sandy Silt & Silty Sand)

BOREHOLE NO.	SAMPLE NO.	GRAIN SIZE DISTRIBUTION ANALYSES (%)			
		GRAVEL	SAND	SILT	CLAY
BH4	SS4	2	52	34	12
BH5	SS5	1	23	65	11

3.2 GROUNDWATER CONDITIONS

Groundwater measurements were conducted during and upon completion of borehole drilling as well as in the installed monitoring wells. Groundwater levels were measured in the monitoring wells on August 16 and September 10, 2021 and were recorded between 1.6 and 3.1 mbgs, corresponding to Elevations of 162.91 m to 165.85 m. The groundwater levels measurements from the monitoring wells are listed in Table 4.

Table 4 Groundwater Level Observations in Monitoring Wells

BH NO.	WELL DEPTH (m)	DATE MEASURED	DEPTH OF GROUNDWATER TABLE (m)	ELEVATION OF GROUNDWATER TABLE (m)
BH1	4.5	8/16/2021	2.3	164.08
		9/10/2021	1.7	164.68
BH4	4.5	8/16/2021	3.2	162.91
		9/10/2021	3.1	163.01
BH5	4.5	8/16/2021	1.8	165.65
		9/10/2021	1.5	165.85

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

4 CONSIDERATIONS ON DESIGN AND CONSTRUCTION OF THE POND

In this section, the subsurface conditions are interpreted as relevant to the design and construction of the Villa Park Pond. Comments relating to construction are intended for the guidance of the design engineer to establish constructability.

4.1 GENERAL INFORMATION OF THE POND

The 30% design drawing for the proposed Villa Park Pond was provided to Englobe by Aquafor Beech Limited (Appendix 4).

The proposed Villa Park Pond will be a wet pond type and consists of a forebay, main cell, separation berm, inlet and outlet structure and inlet spillway. An access road will also be built. The bottom elevation for the proposed pond will be at 162.10 m. With the existing ground at approximately between 165.0 to 167.0 m, the pond area will require a cut with excavations extending to pond design elevation of 162.10 m or about 2.9 m to 4.9 m below existing ground surface. The excavated soils will mainly consist of fill material and cohesive clayey silt to silty clay, with the possibility of sandy silt encountered. Groundwater levels measured in the monitoring wells ranged from 1.6 m to 3.2 m below existing ground surface (Elevations 162.91 m to 165.85 m).

The results of the borehole investigation indicate that the pond base and side slope will comprise of native clayey silt to sandy silt. These soils have an estimated coefficient of permeability ranging from 2.2E-5 m/sec to 2.1E-7 m/sec, considered to be a moderate relative permeability.

Based on the design drawings and the borehole information, our geotechnical comments and recommendations are as follows.

4.2 FOUNDATION CONSIDERATIONS

It is understood that an inlet structure with headwalls, Hickenbottom outlet structure and inlet spillway will be constructed for the proposed pond. Based on borehole information, the proposed structures can be supported by conversional spread and strip footings founded on the undisturbed native soil for a geotechnical reaction of 100 kPa at SLS (Serviceability Limit State), and for a factored geotechnical resistance of 150 kPa at ULS (Ultimate Limit States), at or below Elevation of 164.90 m at the vicinity of BH1 and 163.90 in the vicinity of BH3. Both the total and differential settlements for footings designed to the specified SLS are expected to be less than 25 mm and 19 mm, respectively.

All footings exposed to seasonal freezing conditions must have at least 1.2 metres of soil cover for frost protection.

Where it is necessary to place footings at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

Near the existing buried utilities, all footings must be lowered to undisturbed native soils, or alternatively the services must be structurally bridged.

All footing bases must be examined and approved by a qualified geotechnical engineer.

4.3 TRENCHING, BEDDING AND BACKFILLING FOR PIPES

It is understood that outlet pipe will be installed at the site for the proposed Villa Park Pond.

4.3.1 Trenching

In the planning of the trench's shoring and excavation, the presence of the adjacent existing buried service pipes should be considered. In addition to the stability of these existing adjacent pipes, which must be maintained without detrimental settlements, the backfill in these trenches and especially the granular bedding surrounding the existing service pipes, manholes, etc. may be a source of water, which, if encountered, must be dealt with.

While general stability requirements for varying soil conditions are outlined below, the Occupational Health and Safety Act (OHSA) of Ontario stipulates that any excavation deeper than 1.2m must be shored or cut back at a slope of 1V:1H or flatter, depending on the soil type.

Where permissible under the OSHA, contractors often elect to utilize trench boxes for temporary trench support.

4.3.2 Bedding and Covering

The native stiff to very stiff clayey silt and compact sandy silt encountered in the boreholes will provide adequate support for the pipes and will allow the use of normal Class B type bedding.

The bedding should conform to the current Ontario Provincial Standard specifications and/or standards set by the City of Barrie. Mechanical joint restrains are required in areas where the pipe will lie on the compact fill. At locations where the fill/native soils are loose/weak or considered unsuitable below the pipe invert level, this unsuitable material should be removed and replaced with Granular 'A' or 'B' compacted to 100% of Standard Proctor Maximum Dry Density (SPMDD). Geotechnical inspection is required to confirm suitable subgrade condition.

The minimum bedding thickness should be 150 mm, but this should be increased as dictated by the pipe diameter and/or aforementioned specifications. In addition, where the subgrade is wet, the minimum bedding thickness should be increased to 250 mm.

It is recommended that the bedding material consist of well-graded granular material such as Granular 'A' (OPSS 1010).

A minimum 300 mm thick sand covering is recommended for the pipe.

4.3.3 Trench Backfilling

The select inorganic fill materials or native soils free from topsoil and organics can be used as general trench backfill, provided their moisture contents at the time of construction are at or near optimum.

It is preferable that the native soils be re-used from approximately the position at which they are excavated so that frost response characteristics of the soils after construction remain essentially similar to presently existing, except at the location where the future roads will be constructed, granular 'B' material should be used there. Consideration may also be given to backfilling trenches with a well-graded, compacted granular soil such as Granular 'B' material.

In any case the degree of compaction of the trench backfill should be at least 95% of the material's Standard Proctor Maximum Dry Density (SPMDD). This value should be increased to at least 98% within 2 m of the road surface, if applicable.

4.4 BERM CONSTRUCTION

The founding area of the berm should be stripped and prepared within the footprint of the berm. All vegetation, topsoil, boulders over 100 mm, soft or loose earth fill, reworked soil and other unsuitable soils should be removed from the proposed berm envelope. After stripping, the exposed subgrade should be proof rolled. Any soft spots revealed during proof rolling must be sub-excavated and re-engineered in the presence of a qualified geotechnical engineer.

In order to retain water in the pond and to limit seepage/piping and groundwater intrusion into the berm, it is recommended that the material for the berm construction consist of inorganic low permeability material (silty clay). The berm material should contain minimum 20% clay particles (finer than 0.002 mm) and have a plasticity index (PI) of greater than 10%. Any cobbles or boulders greater than 100 mm in size should be excluded from the earth embankment fill. Earth fill for the berm should be placed in loose lifts not exceeding 250 mm and each lift should be

uniformly compacted to 100 % of the material's Standard Proctor Maximum Dry Density (SPMDD). The materials shall be placed and compacted at a moisture content of ±2 percent of its optimum moisture content. This is required to ensure that the material is compacted to a homogenous mass and does not remain as distinct "clods" or "clumps".

Berm construction should be in accordance with OPSS 501 and to the satisfaction of the geotechnical engineer. The fill must be placed and compacted under the fulltime supervision of qualified geotechnical personnel. It is recommended that a test section be incorporated in the berm during construction. Field tests should be performed on the test section and field compaction curves developed for the equipment used.

Under no condition should frozen materials be placed in the berm. If construction proceeds under winter conditions, then adequate protection against frost penetration must be provided (e.g., straw bales, tarping, heating).

The berm itself will experience settlement resulting from consolidation of the fill. Long-term settlement due to consolidation of embankment fill may require several years after construction. The long-term settlement is expected to be less than 25 mm.

Estimated settlement on the underlying hard cohesive soils in the order of less than 10 mm will occur under the maximum loading imposed by the earth fill embankments which is considered acceptable for the proposed SWMP facility.

An erosion 'blanket' of rip rap overlying filter cloth (or similar) is recommended at the toe of the pond slopes, approximately 1.0 meter above the permanent water level (PWL). It is suggested that the 'blanket' thickness comprise 150 mm riprap placed on filter fabric to a thickness of approximately 300 mm. It is also recommended that pond slopes be vegetated above the PWL by 'hydro-seeding' or 'seeded blankets' or 'sod'.

It is suggested that aquatic plants and riprap shoals for erosion protection be considered in submerged areas and in areas of stormwater inflow (i.e. areas of current and/or turbulence). Other areas may require similar erosion treatment, such as in spillways and forebays, if part of the design.

4.5 CONSIDERATION ON SLOPE STABILITY AND PROTECTION

Slope stability on both cut and fill embankment (berm and pond slope) should be considered during the design. It is expected that embankment and berm slopes for the SWMP will be stable at a minimum 3 Horizontal to 1 Vertical (3H:1V). For embankment and berm slopes below the water level, they will be stable at a minimum 4 Horizontal to 1 Vertical (4H:1V).

Wave and ice action have the potential to cause damage to the slopes of the embankment if these areas are unprotected. Given the short fetch of the pond, there will be no significant wave or ice action. Topsoil and vegetation cover on slope may be sufficient to protect the slopes and can be considered in the design. A regular inspection and maintenance of the slopes should be considered, particularly until the vegetation is properly established.

4.6 LINER CONSIDERATIONS

The soil encountered at the bottom and most of the perimeter area of the proposed pond will be low permeable clayey soils. As such, water infiltrate rate expected to be very low with

exception of the upper portion of the side slope, where sandy silt to silty sand material was encountered.

Fine textured soils with relatively low hydraulic conductivity are expected to encounter during the excavation, as a result, basal heave will not be anticipated during the excavation.

In order to reduce seepage to a rate that will allow the pond to function suitably as intended, an impervious liner is recommended be constructed to limit seepage/piping and groundwater intrusion into the pond.

The liner may consist of a clay liner or a synthetic membrane liner (such as a High-Density Polyethylene or Geo-synthetic Clay Liner). Consider the complication of excavation of the sandy soil and the constructability of a partially clay liner, a Geo-Synthetic Clay Liner (GCL) may be considered for this project.

The GCL must be covered with 0.5 m thick layer of top dressing/reminder layer to protect it from damage. The top dressing/reminder layer will consist of 0.25 m of ballast covered with 0.25 m of native soil. As an alternative to ballast, 0.5 m of native soil can be used if orange plastic “Safety Fence” or another highly visible, continuous marker is embedded 0.3 m above the GCL. The soil used as reminder layer/top dressing should be free of sharp or angular objects greater than 12 mm that may cause damage to the liner. In areas where hydrostatic uplift pressure is present, the GCL will require thicker soil ballast to resist uplift pressures. As the groundwater level is above the lowest elevation of the pond, a subdrain or perimeter drainage system should also be considered beneath the liner to lower the water level during maintenance.

Prior to placing the GCL, the subgrade will need to be prepared in the fulltime presence of a geotechnical engineer. Manufacturer’s specifications and recommendations must be referred for the design and construction of a synthetic liner.

4.7 CHANNEL REALIGNMENT

It is understood that the existing channel will be realigned during the construction of Villa Park Pond. BH2, BH4 and BH5 were drilled along the proposed alignment of the channel.

In preparation of this letter report, detail design of the proposed channel, such as channel cross-section at different station is not available. It is assumed that the bottom of the channel will be at Elevation of 164.69 m to 166.18 m, based on the Invert Elevation of the existing culvert.

Based on the preliminary design information and the subsurface conditions encountered during the investigation, the bottom of the proposed channel will lie mainly within the cohesionless fill material and sandy silt to silty sand deposit with a small portion in cohesive deposits of clayey silt to silty clay. The excavation is anticipated to be carried out through the topsoil, fill material and the native silty clay to clayey silt. Groundwater control during the excavation within the cohesive deposits can be handled, as required, by pumping from properly constructed and

filtered sumps located within the excavations. The side cut slopes of the channels can be considered 3 Horizontal to 1 Vertical (3H:1V) above the water level and 4 Horizontal to 1 Vertical (4H:1V) below the permanent water level.

From the laboratory test results, the onsite silty clay/clayey silt deposit consists over 30% clay which can provide an adequate hydraulic barrier for the channel. Based on the preliminary design provided, the portion of the channel cut within the silty clay/clayey silt deposit and will not require a liner.

However, for the portion of the proposed channel lies in the cohesionless fill or sandy silt to silty sand deposit, clay liner will be required to form a hydraulic barre. The liner should be comprised of the low permeability silty clay. The liner should be 0.6 m thick and extend into the underlying silty clay/clayey silt for a depth of 0.5 m. The liner should extend 1.0 m vertically above the silty sand seam and 2.0 m longitudinally beyond the boundary of the silty sand seam. The liner soil materials should be compacted to 95 % of the material's SPMDD. A qualified geotechnical engineer should be present on site upon commencement of work in this area in order to confirm the liner limits and to verify proper construction of the liner. Prior to the placement of the liner, all of the topsoil and surficial softened native soils must be removed. Any soft spots revealed during proof-rolling must be sub-excavated and re-engineered.

4.8 ACCESS ROAD

An access maintenance road around the pond can be considered as paved or gravel compositions. The pavement structure for the access road is provided below:

Paved:

- 50 mm of HL3 Asphaltic Concrete
- 200 mm of 19mm Crusher Run Limestone

Gravel only:

- 300 mm of 19mm Crusher Run Limestone

Once the subgrade has been inspected and approved by the geotechnical engineer, the granular base and sub-base course materials should be placed and compacted to at least 98% of their respective SPMDD.

4.9 TEMPORARY CONSTRUCTION DEWATERING

The highest ground water levels encountered during the geotechnical investigation was about 1.6 m below present grade as measured in the monitoring well; therefore, it is expected that excavations for trench and pond will intercept the ground water table. In the clayey deposits the trench walls and pond slope are expected to be temporarily stable at 1:1 slopes even below the

water table. The rate of seepage from these deposits can be expected to be slow and if necessary, the trenches can be dewatered by gravity pumping from temporary sumps. Water bearing coarser sandy silt or silty sand seams, or layers would be more pervious and yield more water in excavations extending below the groundwater table.

Further considerations on construction dewatering should be discussed in hydrogeological study report of the site.

4.10 EXCAVATION AND BCKFILLING

Excavations to the designated depth of the pond, for the installation of new structures and berm at this site will be achieved easily using a hydraulic backhoe. The groundwater was found at depth of 1.6 m to 3.2 m below ground surface, corresponding to Elevation of 162.91 m to 165.85 m, which is approximately 0.8 m to 3.7 m above the deepest excavation.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the fill, compact sandy silt to silty sand and firm to very stiff clayey silt material can be classified as Type 3 soil above the groundwater table and Type 4 below groundwater table.

Inorganic fill and native soils free from topsoil and organics can be used as general construction backfill where it can be compacted with sheep's foot type compactors. Loose lifts of soil, which are to be compacted, should not exceed 200 mm thickness per layer.

Imported granular fill, which can be compacted with hand-held equipment, should be used in confined areas.

The excavated on-site clayey silt to sandy silt deposit may be re-use as general backfill for the access road construction where impermeable material is not required, and the soil its-self meets the environmental requirements. The excavated soils are not considered to be free draining. Where free draining backfill is required, imported granular fill such as OPSS Granular B should be used.

It should be noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Soil stockpiles generated as result of site excavation should be protected with tarpaulins to minimize moisture uptake.

5 GENERAL COMMENTS

The comments provided in this report have been developed for the use of Aquafor Beech Limited, The City of Vaughan and their design teams. It should be noted that the soil boundaries

indicated on the Record of Borehole Sheets are inferred from non-continuous sampling and observations during drilling and should not be interpreted as exact planes of geological change. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design. Also, the subsoil and groundwater conditions have been determined at the borehole locations only. Additional boreholes and/or test pits would be necessary to determine the localized conditions. Contractors bidding on, or undertaking the works, must conduct their own interpretations of the factual borehole data, and draw their own conclusions as to how the subsoil and groundwater conditions may affect their construction techniques, scheduling and costs.

It is further noted that, depending on the time of year the field work was completed, water levels should be expected to vary, perhaps significantly from those observed at the time of this investigation.

Appendix 1 Borehole Location Plan

Legend:

BOREHOLE LOCATION

Note:

Seal

Client

Englobe Corp.
1821, Albion Road, Unit 7
Toronto (Ontario) M9W 5W8
Telephone : 416.213.1060
Fax : 416.213.1070

Project

GEOTECHNICAL INVESTIGATION
Stormwater Management Improvements-DMAF
Pine Valley Drive and Villa Park Drive, Vaughan

BOREHOLE LOCATION PLAN
SITE 3

Discipline: GEOTECHNICAL		Prepared by: M. Soufan	Verified by: H. Akbari
Scale: No Scale		Drawned by: M. Soufan	Approved by: H. Akbari
Date: 2021/10/14		Figure n°: 01 of 04	
Page setup: DWG 1	Paper format: ANS: full bleed B (17.00 x 11.00 Inches)	Register n°:	

Resp.	Projet	OTP	Projet/ Disc	Phase/ Type	Réf. élec. / No.Dessin	Rév.
124	C2101989.000	0-01-100	GE	R	01	0A

Appendix 2 Borehole Logs

LOG OF No. P3-BH1

Englobe

Project No. 02101989.000 DRAWING No. _____

Project: Stormwater Management Improvements DMAF - Vaughan, Site 3 Sheet No. 1 of 1

Location: N 4849482.36 E 614598.84

Date Drilled: 8/9/2021

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
			166.38	0
		TOPSOIL: (100 mm)	0.1	
		FILL: sandy silt, trace to some clay, loose, brown, moist	166.3	
			0.8	
		CLAYEY SILT: some sand, firm, brown, moist	165.6	1
			1.5	
		SANDY SILT: some clay, compact, brown, moist	164.9	
			2.3	2
		CLAYEY SILT: trace sand, trace gravel, very stiff, grey, moist	164.1	
			3.0	
		SILTY CLAY: some sand, firm to stiff, grey, moist (Gr: 1%, Sa: 20%, Si: 48%, Cl: 31%)	163.3	3
			5.2	5
		Terminated at 5.2 m	161.2	

1) Borehole advanced using continuous flight solid stem augering on August 9, 2021 by Drilltech Drilling Limited.
2) Monitoring well installed upon completion of drilling with screen depth (1.5 m to 4.5 m).

Standard Penetration Test N Value: 40 80 120 160
Shear Strength kPa: 50 100 150 200
Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES	Sample No	Natural Unit Weight kN/m³	Percent of Fines, %	N	Natural Moisture Content %
	SS1			8	21.0
	SS2			6	12.4
	SS3			26	12.3
	SS4			20	18.0
	SS5			7	15.0
	SS6			13	18.3

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	
8/16/2021	2.3	
9/10/2021	1.7	

Checked By: H.Akbari

Logged By: A.Ahsan

CLASSIFICATION LOG 02101989_STORMWATER_MANAGEMENT_DMAF_SITE_3_BH LOGS.GPJ LOG A GWGL02.GDT 10/19/21

LOG OF No. P3-BH2

Englobe

Project No. 02101989.000 DRAWING No. _____

Project: Stormwater Management Improvements DMAF - Vaughan, Site 3 Sheet No. 1 of 1

Location: N 4849483.99 E 614658.83

Date Drilled: 8/9/2021

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample No	Natural Unit Weight kN/m³	Percent of Fines, %
			167.46		40 80 120 160 / 50 100 150 200	20 40 60				
		TOPSOIL: (75 mm)	0.1	0						
		FILL: sandy silt, some clay, trace gravel, some rootlets, compact, brown, moist	167.4		12	7.4		SS1		
				1	18	17.9		SS2		
		FILL: clayey silt, some sand, oxidized fissures, firm, brown, moist to wet	1.5 165.9		7	23.6		SS3		
		CLAYEY SILT: trace to some sand, trace gravel, stiff to very stiff, brown, moist	2.1 165.3	2	9	16.4		SS4		
				3	19	17.1		SS5		
		-- turns grey		4						
					12	12.9		SS6		
			5.2	5						
		Terminated at 5.2 m	162.3							
		Borehole advanced using continuous flight solid stem augering on August 9, 2021 by Drilltech Drilling Limited.								

CLASSIFICATION LOG 02101989_STORMWATER_MANAGEMENT_DMAF_SITE_3_BH LOGS.GPJ LOG A GWGL02.GDT 10/19/21

Checked By: H.Akbari

Logged By: A.Ahsan

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	

LOG OF No. P3-BH3

Englobe

Project No. 02101989.000 DRAWING No.

Project: Stormwater Management Improvements DMAF - Vaughan, Site 3 Sheet No. 1 of 1

Location: N 4849431.05 E 614637.41

Date Drilled: 8/9/2021

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample No	Natural Unit Weight kN/m³	Percent of Fines, %
			165.46	0	40 80 120 160 / 50 100 150 200	20 40 60				
		TOPSOIL: (125 mm)	0.1							
		FILL: clayey silt, some sand, trace gravel, firm, brown, wet	165.3		7	20.7		SS1		
				1	5	17.6		SS2		
			1.5							
		CLAYEY SILT: some sand, firm to stiff, brown, wet	163.9		7	16.5		SS3		
				2	9	16.9		SS4		
				3	4	14.4		SS5		
				4						
					4	13.5		SS6		
			5.2	5						
		Terminated at 5.2 m	160.3							

Borehole advanced using continuous flight solid stem augering on August 9, 2021 by Drilltech Drilling Limited.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	3.7	

Checked By: H.Akbari

Logged By: A.Ahsan

CLASSIFICATION LOG 02101989_STORMWATER_MANAGEMENT_DMAF_SITE_3_BH LOGS.GPJ LOG A GWGL02.GDT 10/19/21

LOG OF No. P3-BH4

Englobe

Project No. 02101989.000 DRAWING No.

Project: Stormwater Management Improvements DMAF - Vaughan, Site 3 Sheet No. 1 of 1

Location: N 4849454.15 E 614665.74

Date Drilled: 8/9/2021

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
			166.11	0
		TOPSOIL: (75 mm)	0.1	
		FILL: sandy silt, some rootlets, compact, brown, moist	166.0	
			0.8	
		TILL: sandy silt, some clay, trace gravel, compact, brown, moist	165.3	1
			2.1	2
		SILTY SAND: trace to some clay, compact, brown, moist (Gr: 2%, Sa: 52%, Si: 34%, Cl: 12%)	164.0	
			3.0	3
		CLAYEY SILT: some sand, stiff, brown, moist	163.1	
			4.1	4
		SILTY CLAY: trace sand, stiff, grey, moist	162.0	
			5.2	5
		Terminated at 5.2 m	160.9	

1) Borehole advanced using continuous flight solid stem augering on August 9, 2021 by Drilltech Drilling Limited.
2) Monitoring well installed upon completion of drilling with screen depth (1.5 m to 4.5 m).

Standard Penetration Test N Value: 40 80 120 160
Shear Strength: 50 100 150 200 kPa
Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES	Sample No	Natural Unit Weight kN/m³	Percent of Fines, %	SPT (N)	Natural Moisture Content %
	SS1			13	13.6
	SS2			11	15.4
	SS3			26	12.9
	SS4			20	13.8
	SS5			8	16.9
	SS6			10	13.8

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	
8/16/2021	3.2	
9/10/2021	3.1	

Checked By: H.Akbari

Logged By: A.Ahsan

CLASSIFICATION LOG 02101989_STORMWATER_MANAGEMENT_DMAF_SITE_3_BH LOGS.GPJ LOG A GWGL02.GDT 10/19/21

LOG OF No. P3-BH5

Englobe

Project No. 02101989.000 DRAWING No. _____

Project: Stormwater Management Improvements DMAF - Vaughan, Site 3 Sheet No. 1 of 1

Location: N 4849402.55 E 614659.26

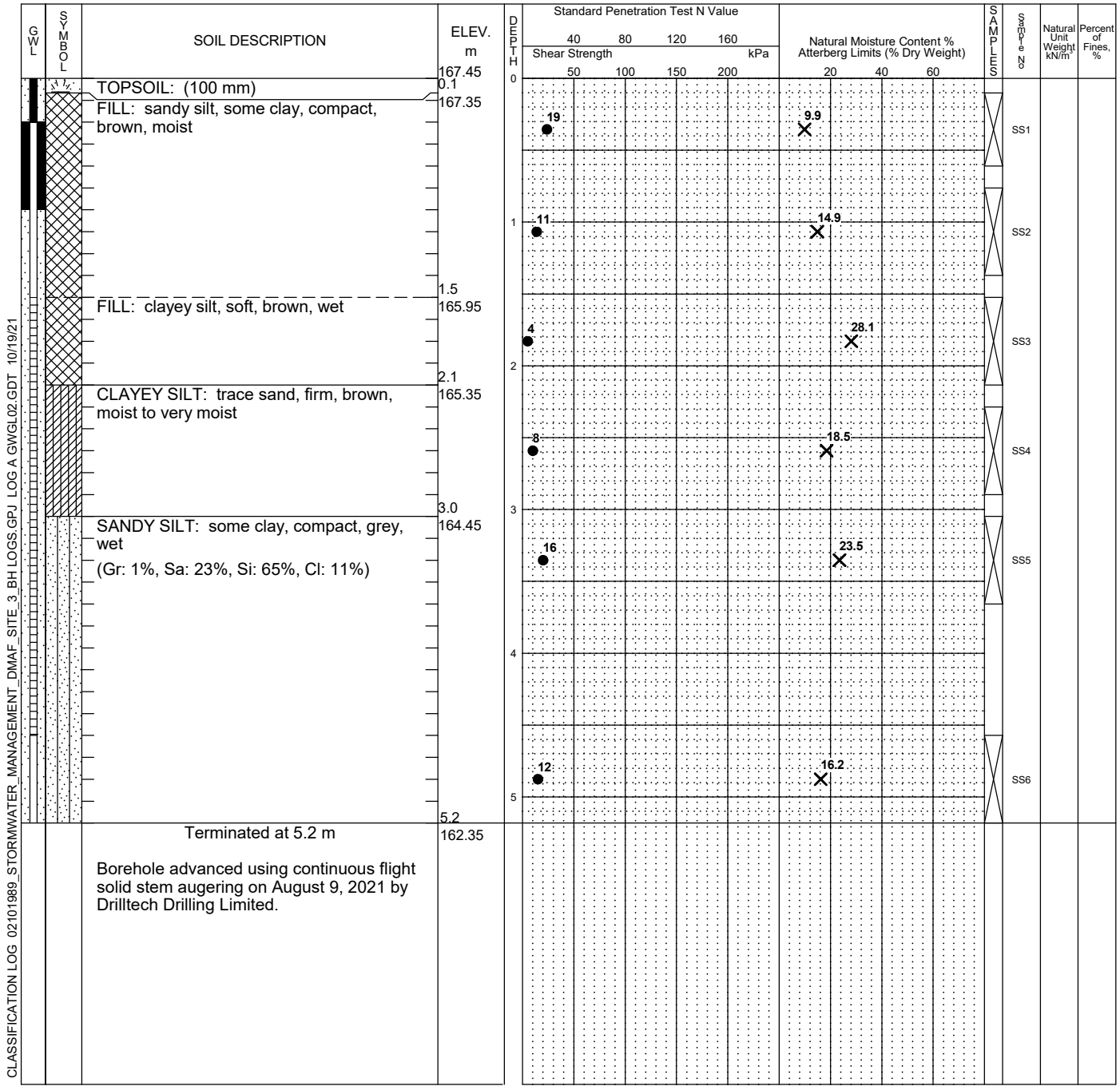
Date Drilled: 8/9/2021

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits |—○—|
Undrained Triaxial at % Strain at Failure 0 / 5 / 10 / 15 ⊕
Shear Strength by Penetrometer Test ▲



Time	Water Level (m)	Depth to Cave (m)
Upon Completion	4.3	
8/16/2021	1.8	
9/10/2021	1.6	

Appendix 3 Geotechnical Laboratory Test Results

Englobe
1821 Albion Road, Unit 7, Toronto (Ontario) M9W 5W8
T 416.213.1060 | F 416.213.1070
toronto@englobecorp.com | www.englobecorp.com

GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT
MTO LS-602, 702, AND 703/704

PROJECT: 02101989.000 CLIENT/JOB NAME: Aquafor Beach Ltd. CONTRACT NUMBER: -

ROS ID: 98315 PROJECT/LOCATION: Stormwater Management Improvements DMAF, Site # 3 / SITE # 3

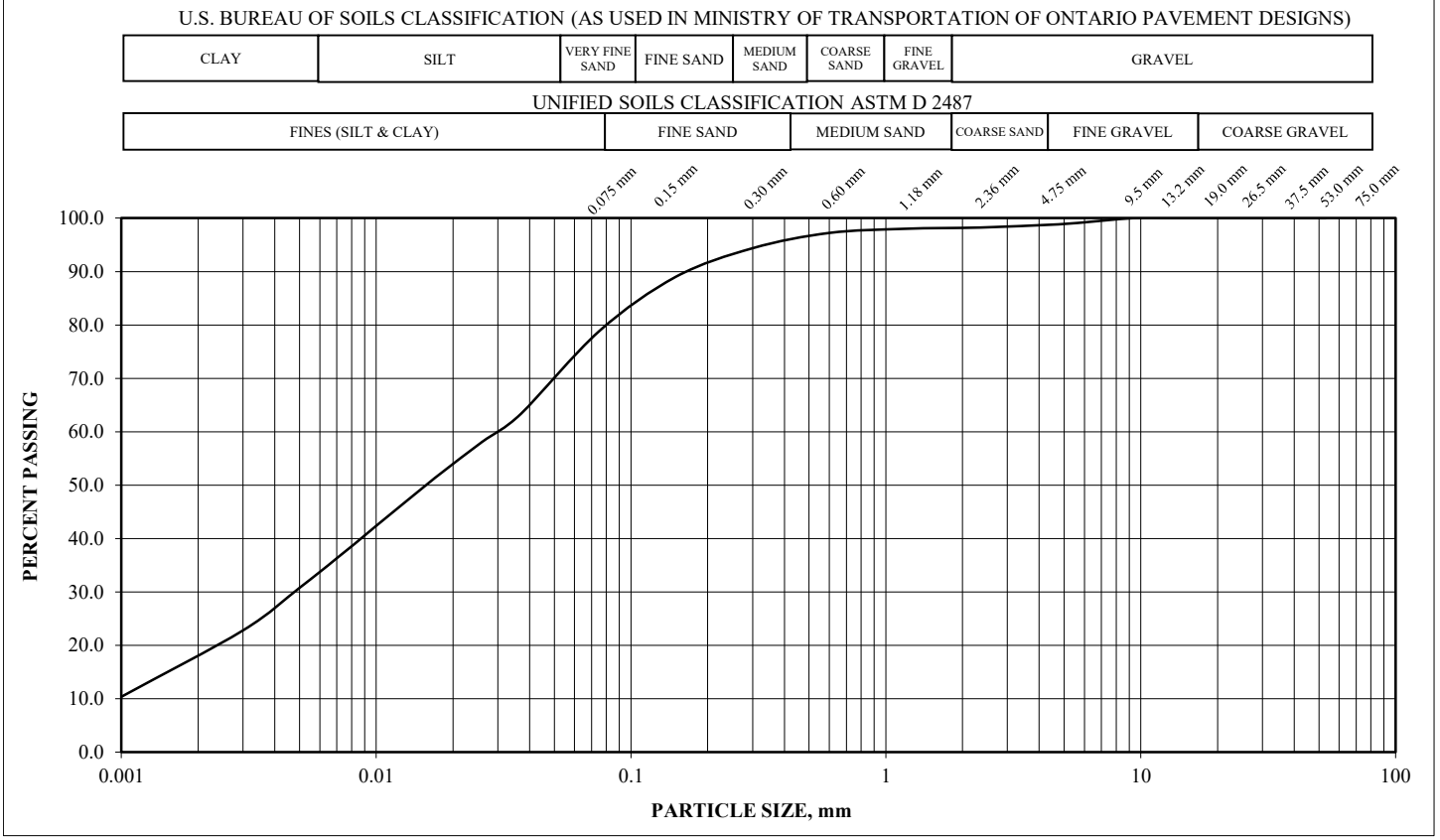
SAMPLING LOCATION:	BH1_SS5
SAMPLING DEPTH, m	-
SAMPLING METHOD:	Split Spoon
SAMPLED BY:	S.A. Englobe
SAMPLE DESCRIPTION:	Sandy Silty Clay trace Gravel
SAMPLING DATE:	2021-08-10
SAMPLE RECEIVED DATE:	2021-08-10

GRAIN SIZE PROPORTIONS, %

% GRAVEL (> 4.75 mm):	1.2
% SAND (75 µm to 4.75 mm):	20.0
% Silt (5 µm to 75 µm):	48.0
% Clay (<5 µm):	30.8
SUSCEPTIBILITY TO FROST HEAVING:	Moderate

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	63.4
37.5	100.0	0.026	58.0
26.5	100.0	0.017	51.3
19.0	100.0	0.010	42.3
13.2	100.0	0.007	36.3
9.5	100.0	0.005	30.8
4.75	98.8	0.003	22.8
2.36	98.2	0.001	10.4
1.18	98.0	ATTERBERG LIMITS, %	
0.60	97.2		
0.30	94.3	Plastic Limit	
0.15	89.0	Liquid Limit	
0.075	78.8	Plastic Index	

PARTICLE SIZE DISTRIBUTION, MTO LS-702



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toronto@englobecorp.com | www.englobecorp.com

GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT
MTO LS-602, 702, AND 703/704

PROJECT: 02101989.000 CLIENT/JOB NAME: Aquafor Beach Ltd. CONTRACT NUMBER: -

ROS ID: 98315 PROJECT/LOCATION: Stormwater Management Improvements DMAF, Site # 3 / SITE # 3

SAMPLING LOCATION:	BH4_SS4
SAMPLING DEPTH, m	-
SAMPLING METHOD:	Split Spoon
SAMPLED BY:	S.A. Englobe
SAMPLE DESCRIPTION:	Sandy Silt with Clay trace Gravel
SAMPLING DATE:	2021-08-10
SAMPLE RECEIVED DATE:	2021-08-10

GRAIN SIZE PROPORTIONS, %

% GRAVEL (> 4.75 mm):	1.7
% SAND (75 µm to 4.75 mm):	51.8
% Silt (5 µm to 75 µm):	34.0
% Clay (<5 µm):	12.5
SUSCEPTIBILITY TO FROST HEAVING:	Low

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	32.0
37.5	100.0	0.026	27.5
26.5	100.0	0.017	23.3
19.0	100.0	0.010	18.3
13.2	100.0	0.007	15.2
9.5	100.0	0.005	12.5
4.75	98.3	0.003	9.4
2.36	97.0	0.001	6.6
1.18	96.3	ATTERBERG LIMITS, %	
0.60	95.3		
0.30	90.9	Plastic Limit	
0.15	69.8	Liquid Limit	
0.075	46.5	Plastic Index	

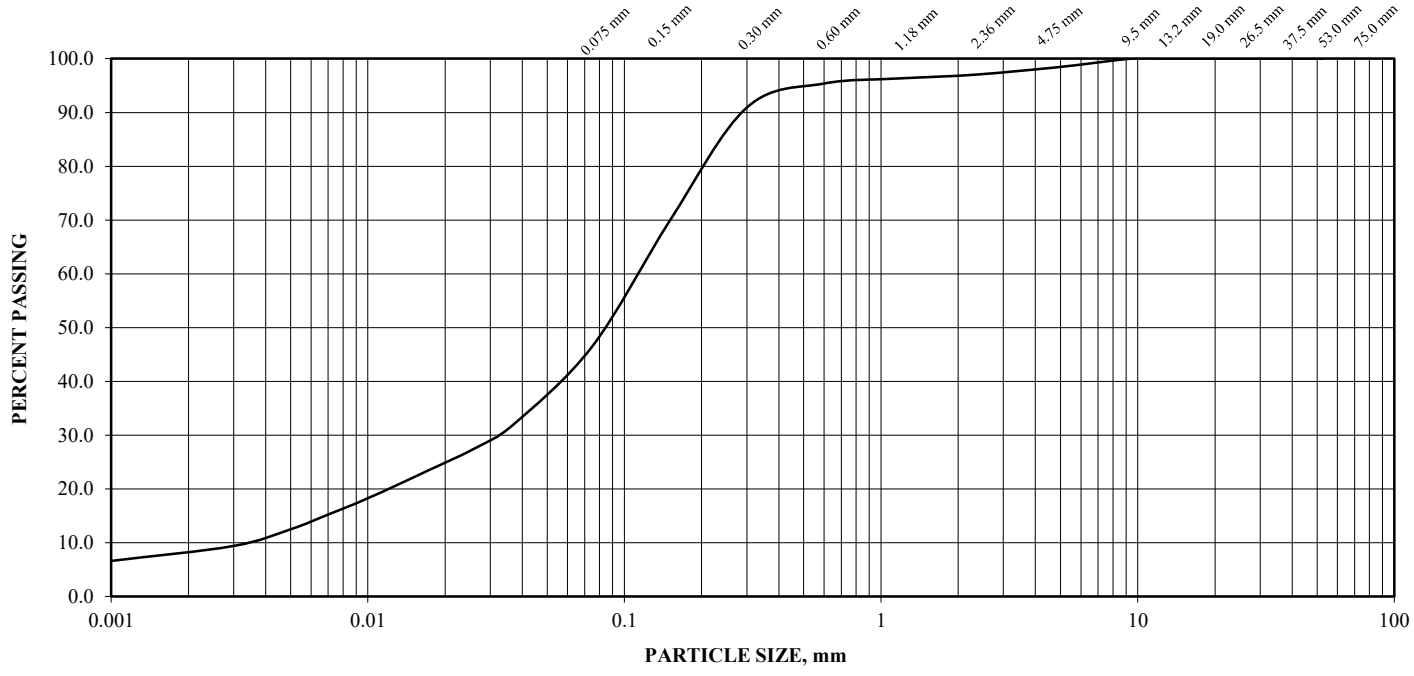
PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL

UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL



Englobe
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toronto@englobecorp.com | www.englobecorp.com

GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT
MTO LS-602, 702, AND 703/704

PROJECT: 02101989.000 CLIENT/JOB NAME: Aquafor Beach Ltd. CONTRACT NUMBER: -

ROS ID: 98315 PROJECT/LOCATION: Stormwater Management Improvements DMAF, Site # 3 / SITE # 3

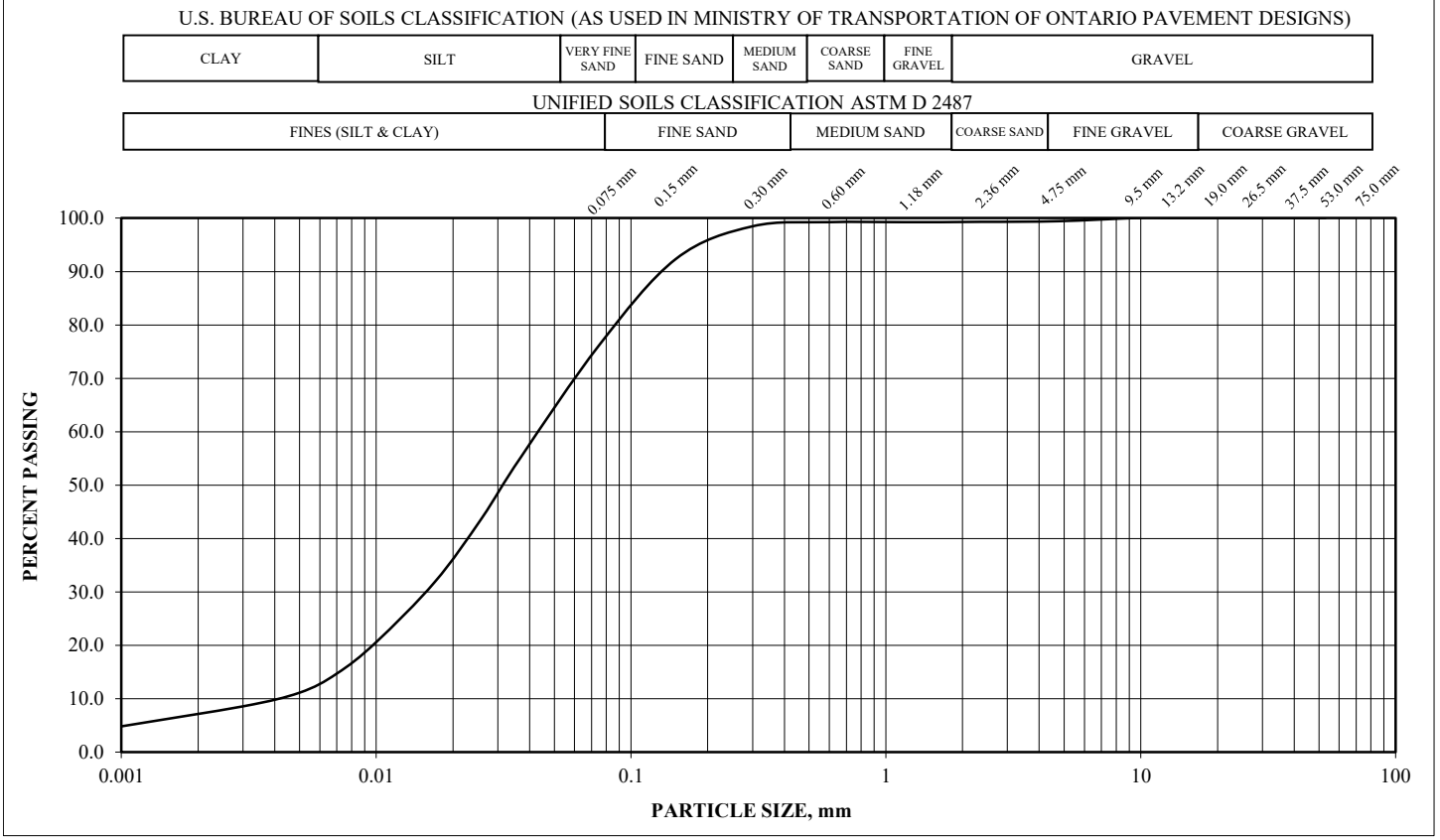
SAMPLING LOCATION:	BH5_SS5
SAMPLING DEPTH, m	-
SAMPLING METHOD:	Split Spoon
SAMPLED BY:	S.A. Englobe
SAMPLE DESCRIPTION:	Sandy Silt with Clay trace Gravel
SAMPLING DATE:	2021-08-10
SAMPLE RECEIVED DATE:	2021-08-10

GRAIN SIZE PROPORTIONS, %

% GRAVEL (> 4.75 mm):	0.6
% SAND (75 µm to 4.75 mm):	23.2
% Silt (5 µm to 75 µm):	65.0
% Clay (<5 µm):	11.2
SUSCEPTIBILITY TO FROST HEAVING:	High

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	55.3
37.5	100.0	0.026	43.9
26.5	100.0	0.017	31.9
19.0	100.0	0.010	20.6
13.2	100.0	0.007	14.7
9.5	100.0	0.005	11.2
4.75	99.4	0.003	8.6
2.36	99.3	0.001	4.8
1.18	99.2	ATTERBERG LIMITS, %	
0.60	99.2		
0.30	98.5	Plastic Limit	
0.15	92.3	Liquid Limit	
0.075	76.2	Plastic Index	

PARTICLE SIZE DISTRIBUTION, MTO LS-702



Appendix 4 30% Design Drawing

VAUGHAN

Infrastructure Delivery

CONTRACT FOR :

SITE #3

VILLA PARK DRIVE

TENDER No. T_____

PROJECT No. _____

LIST OF DRAWINGS

DWG No.	DESCRIPTION
1 of 3	GENERAL NOTES
2 of 3	EXISTING CONDITIONS
3 of 3	PROPOSED CONDITIONS

FILE No. _____

TENDER No. _____

PROJECT No. _____

LOCATION

Printed: Sep. 30, 2021

GENERAL NOTES

1. THE NOTES ON THESE DRAWINGS APPLY TO ALL WORKS UNDER THIS CONTRACT UNLESS OTHERWISE INDICATED ON THESE SETS OF PLANS.

2. THE STANDARD DRAWINGS OF THE CITY OF VAUGHAN, THE REGIONAL MUNICIPALITY OF YORK AND THE ONTARIO MINISTRY OF TRANSPORTATION CONSTITUTE PART OF THIS SET OF PLANS AND SHALL BE THE REVISION IN EFFECT AS OF THE DATE OF APPROVAL OF THE CONSTRUCTION DRAWINGS.

3. ALL CONSTRUCTION WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE "OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS".

4. INFORMATION REGARDING ANY EXISTING SERVICES AND/OR UTILITIES SHOWN ON THIS SET OF PLANS IS FURNISHED AS THE BEST AVAILABLE INFORMATION AT THE TIME OF PREPARATION. THE CONTRACTOR SHALL INTERPRET THIS INFORMATION AS HE/SHE SEES FIT WITH THE UNDERSTANDING THAT THE OWNER, THE CITY AND ENGINEER DISCLAIM ALL RESPONSIBILITY FOR ITS ACCURACY AND/OR SUFFICIENCY.

5. THE CONTRACTOR SHALL NOTE THAT THERE MAY BE OVERHEAD AND UNDERGROUND UTILITIES WHICH ARE NOT SHOWN ON THESE DRAWINGS. SOME, OR ALL OF THESE UTILITIES MAY REQUIRE SHIELDING OR OTHER APPROPRIATE FORM OF PROTECTION AS SPECIFIED BY THE RESPECTIVE UTILITY COMPANIES, OR ANY OTHER APPLICABLE LEGISLATION IN FORCE. CONTRACTORS SHALL THOROUGHLY FAMILIARIZE THEMSELVES WITH THE NUMBER OF LOCATIONS OF THE OVERHEAD UTILITY CABLES. ANY UTILITY DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE UTILITY COMPANY AT THE CONTRACTOR'S EXPENSE. THE COST OF THE SHIELDING WHERE REQUIRED SHALL BE DEEMED TO BE INCLUDED IN THE UNIT PRICES BID, WITH NO ADDITIONAL PAYMENT TO BE MADE TO THE CONTRACTOR.

6. ALL DIMENSIONS AND ELEVATIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND HE/SHE SHALL REPORT ANY DISCREPANCIES TO THE CITY IMMEDIATELY. DETAILS ARE NOT TO BE SCALED FROM THE DRAWINGS. ALL DIMENSIONS ARE SHOWN IN METRES UNLESS OTHERWISE NOTED.

7. ALL AREAS DISTURBED BY THE CONTRACTOR DURING CONSTRUCTION OF THE WORKS SHOWN HEREON SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER. ALL GRASS AND VEGETATION COVERED AREAS SHALL BE RESTORED BY PLACING 100mm OF APPROVED TOPSOIL AND SOD TO ESTABLISH A GRASS COVER, UNLESS OTHERWISE NOTED ON THE PLANS, TO THE SATISFACTION OF THE CITY. CLEARING OF ANY VEGETATION OTHER THAN THAT DETAILED ON THE CONTRACT DRAWINGS, SHALL NOT BE UNDERTAKEN WITHOUT SPECIFIC WRITTEN DIRECTION BY THE ENGINEER. VERTICAL TRENCHING, HAND TRENCHING, AUGERING AND IMMEDIATE BACKFILLING OF ANY TRENCH SHALL BE UNDERTAKEN BY THE CONTRACTOR AS NECESSARY TO ENSURE THAT ALL REASONABLE PRECAUTIONS ARE TAKEN TO PROMOTE THE SURVIVAL OF ANY EXISTING VEGETATION.

8. THE CONTRACTOR SHALL PROTECT ALL EXISTING TREES WITHIN THE WORK AREAS. SHOULD ANY TREE CONFLICT WITH THE PROPOSED WORKS, THE CITY SHALL BE NOTIFIED IMMEDIATELY TO DETERMINE A COURSE OF ACTION. NO TREES SHALL BE REMOVED WITHOUT WRITTEN CONSENT FROM THE CITY.

9. VEHICULAR TRAFFIC AND ACCESS TO ALL DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES DURING THE WORK. SHOULD ACCESS TO ANY DRIVEWAYS BE TEMPORARILY CUT-OFF, THE CONTRACTOR SHALL NOTIFY THE OWNERS 24 HOURS IN ADVANCE AND ENSURE THAT THE DRIVEWAY ACCESS IS RESTORED AS QUICKLY AS POSSIBLE. THE CONTRACTOR SHALL PREPARE A TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL BY THE CITY PRIOR TO START OF CONSTRUCTION.

10. APPROVED FILL MATERIAL SHALL BE COMPACTED TO A DRY DENSITY AS PER THE SPECIFICATIONS. COMPACTION TESTS SHALL BE CONDUCTED BY A QUALIFIED SOIL ENGINEER TO ENSURE COMPACTION AND STABILITY OF THE FILL AND TEST RESULTS SHALL BE SUBMITTED TO THE CITY, THE CONTRACTOR AND THE CONSULTANT. ANY APPROVED FILL MATERIAL BROUGHT ON SITE SHALL BE CERTIFIED BY A QUALIFIED GEOTECHNICAL ENGINEER AND SHALL INCLUDE AN ENVIRONMENTAL ANALYSIS REPORT FOR METALS AND INORGANIC PARAMETERS.

11. ALL TRENCHING SHALL BE CARRIED OUT IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT, THE TRENCH EXCAVATORS PROTECTION ACT AND THE ONTARIO MINISTRY OF LABOUR ACT.

ROADWORKS

1. THE DATA INCLUDED IN THE REPORT PAVEMENT/GEOTECHNICAL REPORT IS NOT NECESSARILY COMPLETE AND SHALL BE CONSIDERED FOR GENERAL REFERENCE ONLY. THE CITY OF VAUGHAN ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE REPORT'S INFORMATION.

2. APPROVED GRANULAR MATERIAL TO BE COMPACTED TO A DRY DENSITY OF NOT LESS THAN 100% SPMDD. AFTER COMPACTION, SOIL DENSITY TESTS SHALL BE CONDUCTED TO ENSURE ADEQUATE COMPACTION.

3. ROAD CROSS-SECTION, INTERSECTION AND HORIZONTAL ALIGNMENT SHALL CONFORM TO THE STANDARD DRAWINGS OF THE CITY UNLESS OTHERWISE NOTED.

4. THE REQUIRED PAVEMENT STRUCTURE THICKNESS, WITHIN THE ROAD ALLOWANCE IS AS PER TYPICAL SECTIONS.

5. ALL DRIVEWAYS ARE TO BE REINSTATED AS PER CONTRACT SPECIFICATIONS OR AS SHOWN. ALL EXISTING DRIVEWAY CULVERTS AND RETAINING WALLS WITHIN THE RIGHT-OF-WAY ARE TO BE REMOVED AND DISPOSED OFF-SITE. ALL EXISTING TIMBER, PRECAST OR CAST IN PLACE DRIVEWAY CURBS DISTURBED BY DRIVEWAY RECONSTRUCTION SHALL BE RESTORED IN KIND AND EXTENDED TO MEET THE NEW ROADWAY CURB WHERE SHOWN ON THE DRAWINGS TO THE SATISFACTION OF THE CITY.

6. ALL CURB SHALL BE CAST-IN-PLACE FULL STAGE CONCRETE CURB AND GUTTER AS PER OPSD 600.040, CITY STANDARD F-1. THE MINIMUM SLOPE ALONG ANY GUTTER SHALL BE 0.50%.

7. 2 – 15m BARS SPACED 350mm APART SHALL BE PLACED WITHIN CURBS THROUGH ALL ENTRANCES AND DRIVEWAYS.

8. SUBDRAINS IF REQUIRED SHALL BE 100mm DIAMETER PERFORATED PVC PIPE AS PER OPSS FORM 405, PRE-WRAPPED BY THE MANUFACTURERS WITH GEOTEXTILE FILTER FABRIC MEETING OPSS FORM 1860 AND INSTALLED UNDER ALL CURBS IN ACCORDANCE WITH CITY STANDARD F-2. THE CONTRACTOR IS TO ENSURE THAT THE SUBGRADE IS GRADED TO PROVIDE POSITIVE DRAINAGE TO THE SUBDRAINS AND THAT THE SUBDRAINS OUTLET INTO CATCHBASINS.

9. ALL MANHOLE COVERS ARE TO BE ADJUSTED TO SUIT THE PROPOSED ROAD AND BOULEVARD GRADES. ANY UNSUITABLE BRICK RISERS ARE TO BE REMOVED AND REPLACED WITH PRE-CAST CONCRETE ADJUSTMENT UNITS. NEW FRAME AND COVERS ARE TO BE PROVIDED BY THE CONTRACTOR WHERE DEEMED NECESSARY BY THE CITY.

10. ALL PAVEMENT MARKINGS SHALL BE PLACED AS SPECIFIED IN THE CONTRACT DOCUMENT.

STORM AND SANITARY SEWERS

1. MAIN LINE PVC PIPE SHALL BE DR35.
2. EMBEDMENT MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR 'A' NATIVE OR GRANULAR 'A' RCM ACCORDING TO OPSS 1010 AND COMPACTED TO A MINIMUM 98% STANDARD PROCTOR MAXIMUM DRY DENSITY.
3. BEDDING FOR RIGID PIPE SHALL BE CLASS B BEDDING MATERIAL ACCORDING TO OPSD 802.031 AND USING GRANULAR 'A' NATIVE OR GRANULAR A RCM BEDDING MATERIAL ACCORDING TO OPSS 1010 AND COMPACTED TO MINIMUM 98% STANDARD PROCTOR MAXIMUM DRY DENSITY.
4. MAINTENANCE HOLES SHALL BE ACCORDING TO CITY OF VAUGHAN STANDARD M-1, FRAME AND COVER AS PER OPSD 401.010.
5. MAINTENANCE HOLE CHAMBER OPENING SHALL BE LOCATED ON THE UPSTREAM SIDE OF THE MAINTENANCE HOLE.
6. BENCHING DETAILS SHALL BE ACCORDING TO OPSD 701.021, OR AS SHOWN IN THE DRAWINGS.
7. DROP STRUCTURES SHALL BE ACCORDING TO OPSD 1003.020, OR OTHERWISE NOTED.
8. REINFORCED CONCRETE PIPE SHALL BE MINIMUM 65D. HEIGHT OF FILL TO BE VERIFIED USING OPSD TABLES 807.010 AND 807.030.
9. CONNECTION DETAIL FOR SEWER PIPE AT CATCH BASINS AND MAINTENANCE HOLES SHALL BE ACCORDING TO OPSD 708.020.
10. INSULATION REQUIRED FOR CROSSING WATERMAINS WHICH DO NOT MEET SEPARATION REQUIREMENTS SHALL BE PER OPSD 1109.030.
11. CATCH BASIN LEAD CONNECTIONS SHALL BE INSTALLED PER OPSD 708.020 AND 708.030 OR AS SHOWN IN THE CONTRACT DRAWINGS.
12. LEAD CONNECTIONS TO STORM SEWERS SHALL ADHERE TO OPSD 708.010.

Printed: Sep. 30, 2021

GENERAL DEWATERING NOTES:

1. PRIOR TO FULLY DEWATERING, A FISH AND WILDLIFE RELOCATION OPERATION SHALL BE COMPLETED BY CITY RETAINED BIOLOGIST WHO OBTAINED PERMIT AND SHALL BE COMPLETED PRIOR TO DREDGING. ISOLATE WORK AREA AS REQUIRED SHOULD COLLECTION BE COMPLETED PREEMPTIVELY BEFORE CONSTRUCTION. NO FISH OR OTHER WILDLIFE SHALL BE PRESENT IN THE ISOLATED WORK AREA UPON COMMENCEMENT OF CONSTRUCTION WORKS.
2. ALL DEWATERING SHALL BE DISCHARGED INTO A SEDIMENT BAG. THE DEWATERING SYSTEM SHALL BE MONITORED FOR EFFECTIVENESS TO ENSURE NO SEDIMENT ENTERS THE WATERCOURSE.
3. CONTRACTOR SHALL MONITOR PUMP RATES. CONTINUOUS FLOW AND DEWATERING PUMPING TO DISCHARGE POINT SHALL BE MAINTAINED AT A SUITABLE RATE TO PREVENT EROSION AND MANAGE SEDIMENT BAG.
4. BACK-UP PUMP TO BE ON-SITE.
5. SEDIMENT BAG, SITE DEWATERING AND WATER DIVERSIONS TO BE IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN CONSTRUCTION (DEC 2006).
6. PUMP INTAKE TO MEET DEPARTMENT OF FISHERIES AND OCEANS FRESHWATER INTAKE END-OF-PIPE FISH SCREEN GUIDELINE (MARCH 1995) AND DETAIL 06, SHEET ESC-1.
7. PUMP ACTIVITIES SHALL ADHERE TO THE RESTRICTIONS AND LIMITATION OUTLINED WITHIN THE MUNICIPAL BYLAW UNLESS PERMISSION IS ACQUIRED FROM THE OWNER.
8. PUMPING SHALL BE CONDUCTED UNTIL THE DISCHARGE FROM SEDIMENT BAG SHOWS VISIBLE SIGNS OF SEDIMENTATION AND IS NO LONGER CLEAR AT WHICH POINT SEDIMENTATION CONTROL WILL BE REPLACED AS DIRECTED BY CONTRACT ADMINISTRATOR.
9. TO MAXIMIZE DEWATERING, THE CONTRACTOR SHALL SKIM WATER FROM THE TOP OF THE POND RATHER THAN DEWATERING FROM THE BOTTOM AND SHALL TRANSITION TO DETAIL 3, THIS SHEET AS WATER LEVELS DROP TO WITHIN 300mm OF POND BOTTOM. ALL DEWATERING SHALL BE DISCHARGED IN A MANNER TO PREVENT SEDIMENT FROM ENTERING WATERCOURSE OR SCOURING AND ERODING AT THE OUTLET.
10. ALL DEWATERING/UNWATERING SHALL BE TREATED AND RELEASED TO THE ENVIRONMENT AT LEAST 30 METRES FROM A WATERCOURSE OR WETLAND AND ALLOWED TO DRAIN THROUGH A WELL VEGETATED AREA. NO DEWATERING EFFLUENT SHALL BE SENT DIRECTLY TO ANY WATERCOURSE, WETLAND OR FOREST, OR ALLOWED TO DRAIN ONTO DISTURBED SOILS WITHIN THE WORK AREA. THESE CONTROL MEASURES SHALL BE MONITORED FOR EFFECTIVENESS AND MAINTAINED OR REVISED TO MEET THE OBJECTIVE OF PREVENTING THE RELEASE OF SEDIMENT LADEN WATER.
11. THE CONTRACTOR SHALL MONITOR THE FIVE DAY WEATHER FORECAST ON A DAILY BASIS TO ANTICIPATE WEATHER CONDITIONS AND SHALL BE PREPARED TO LEAVE THE SITE IN A STABLE AND SECURE CONDITION SHOULD WATER LEVELS RISE. ALL WORKS SHALL BE COMPLETED IN FAVORABLE WEATHER CONDITIONS SHOULD AN UNEXPECTED STORM ARISE, THE CONTRACTOR WILL SECURE THE SITE.
12. IN THE EVENT OF A RAINFALL EVENT DURING SEDIMENT REMOVAL OPERATIONS, BYPASS AND DEWATERING SHALL CEASE AND THE POND ALLOWED TO FUNCTION AS DESIGNED. DEWATERING AND BYPASS SHALL RESUME ONCE STORM INFLOWS TO THE POND HAVE CEASED.
13. REMOVE ALL METERBAGS/COFFER DAMS USED TO ISOLATED WORK AREAS SHALL BE REMOVED IN ANTICIPATION OF SIGNIFICANT RAINFALL EVENTS TO PREVENT STORMSEWER SURCHARGING AND BACK-UPS.
14. ANY AND ALL ACCUMULATED AND/OR STORED WATER WITHIN THE DREDGING AREAS AND/OR THE LIMITS OF CONSTRUCTION ARE TO BE ALLOWED A MINIMUM 12-24 HOURS TO SETTLE OUT ALL SUSPENDED SEDIMENTS PRIOR TO PUMPING/DISCHARGE TO SEDIMENT BAGS AND DESIGNATED AREA.
15. IN THE EVENT THAT THE EXCAVATED/DREDGING AREA IS FILLED OR BECOMES PARTIALLY FILLED WITH STORMWATER, THE CONTRACTOR SHALL ACQUIRE A QUALIFIED BIOLOGIST, AT HIS/HER OWN EXPENSE, TO UNDERTAKE A FISH RESCUE PRIOR TO DEWATERING OR CONTINUING WITH THE PROPOSED WORK, INCLUDING PUMPING ACTIVTIES MAY CONTINUE ONCE THE FISH RESCUE IS COMPLETED.
16. CONTINUOUS INCOMING FLOWS ARE TO BE COLLECTED AND MANAGED BY CONSTRUCTING AN IMPERMEABLE BERM AT THE INLET TO THE SWM FACILITY.

DEWATERING AND BYPASS PREPARATION NOTES:

1. ERECT AND INSTALL ALL EROSIONS AND SEDIMENTATION CONTROL PRIOR TO UNDERTAKING DEWATERING OPERATIONS INCLUDING DISCHARGE LOCATION #1 AND SEDIMENT BAGS PER DETAIL 1 & 5, SHEET ESC-1. CONTRACTOR TO INSTALL METER BAGS AROUND THE SEDIMENT BAG AND MH LID TO ENSURE POSITIVE DRAINAGE FROM THE SEDIMENT BAG TO THE MH.
2. THE CONTRACTOR SHALL CLOSELY MONITOR AND MAINTAIN THE METER BAGS TO ENSURE THE DISCHARGE FROM THE SEDIMENT BAG IS BEING SUFFICIENTLY CONTROLLED.

CONTINUOUS FLOWS DEWATERING AND BYPASS NOTES:

1. ERECT AND INSTALL ALL EROSIONS AND SEDIMENTATION CONTROL PRIOR TO UNDERTAKING DEWATERING OPERATIONS AS SHOWN IN PLANS.

1. COMPLETE ALL WILDLIFE AND FISH COLLECTIONS REQUIRED BEFORE FULL DEWATERING.

2. POSITION PUMP AT CONTINUOUS DEWATERING INTAKE POINT #1 & #2.

3. LAYOUT HOSES AND APPURTENANCES AS REQUIRED.COMBINE CONTINUOUS BYPASS FLOWS FROM INLETS AS REQUIRED TO MAINTAIN A CLUTTER FREE WORK ENVIRONMENT.

4. SETUP DISCHARGE LOCATION AS PER DETAILS AND BEGIN PUMPING FROM CONTINUOUS PUMPING INTAKE #1 & #2 TO MANAGE CONTINUOUS FLOWS FROM INLET. PUMP TO DISCHARGE LOCATION #1 AS SHOWN.

PERMANENT POOL DEWATERING AND BYPASS NOTES:

1. FOLLOWING EXCAVATION, POSITION PUMPS AT INTAKE POINTS #3 AND #4 TO DISCHARGE LOCATION #1 TO CONTROL WATER LEVELS IN FOREBAYS AND MAIN CELL.
2. MAINTAIN INTAKES #1-4 TO CONTINUOUSLY CONTROL FOREBAY AND MAIN CELL WATER LEVELS SUCH THAT WATER WITHIN FOREBAY DOES NOT DRAIN INTO MAIN CELL
3. COMPLETE EXCAVATION AND POND INSTALLATION WORKS PER CONSTRUCTION PHASING NOTES.
4. FOLLOWING CONSTRUCTION AND FLUSHING WORKS DECOMMISSION ALL INTAKE POINTS. REMOVE ALL IMPERMEABLE METERBAGS/COFFER DAMS, PUMPS AND APPURTENANCES, EROSION CONTROLS, SEDIMENT BAGS AND RESTORE ALL DISTURBED AREAS.

LIST OF SYMBOLS

Symbol	Description	Symbol	Description	Symbol	Description
B	BELL CABLE MAKER	TL	TRAFFIC LIGHT	PEG	$*PEG
BELL MH	BELL MANHOLE	TL/LS	TRAFFIC LIGHT WITH LUMINAIRE	RIB	ROUND IRON BAR
BP	BELL POLE	BBALL NET	BASKET BALL NET	SIB	STANDARD IRON BAR
BPD	BELL PEDESTAL	FOUNTAIN	FOUNTAIN	SSIB	SHORT STANDARD IRON BAR
TVCB	TV CABLE BOX	FLAG POST	FLAG POST		
TV	TV CABLE MARKER	MAIL	MAILBOX – SUPER		
BOL	BOLLARD	MH	MANHOLE		
LB	LIGHTED BOLLARD	MW	MONITORING WELL	AV	AIR VALVE
POST	FENCE POST	ROCK	ROCK	CS	CURB STOP
G	GAS LINE MARKER	PS	PUMPING STATION	CV	CHECK VALVE
GV	GAS VALVE	SAN MH	SANITARY MANHOLE	DV	DRAIN VALVE
EO	ELECTRIC OUTLET		$1 $2 $3 $4 – SIGN	HYD	FIRE HYDRANT
FL	FLOOD LIGHT		CATCH BASIN	OHW	IRRIGATION HANDWELL
GL	GROUND LIGHT	DICB	DITCH INLET CATCH BASIN	JV	CHAMBER VENT
H	HYDRO LINE MARKER	CB/MH	CATCH BASIN MANHOLE	Meter Chamber	$*PEG
HP	HYDRO POLE	STM MH	STORM MANHOLE	PRV	PRESSURE RELEASE VALVE
HPL	HYDRO POLE WITH LUMINAIRE	BM	BENCH MARK	SPK	SPRINKLER HEAD
HYDRO TOWER	HYDRO TOWER	HCM	HORIZONTAL CONTROL MONUMENT	VC	VALVE CHAMBER
HYDRO TRANS	HYDRO TRANSFORMER		TRAVERSE STATION	WV	WATER VALVE
HYDRO TRANS PAD	HYDRO TRANSFORMER & CONC. PAD	TBM	TEMPORARY BENCH MARK	FDC MH	WATER VALVE
OHW	HANDWELL	CC	CUT CROSS	GB	GARBAGE BIN
LP	LAMP POST	FIB	FOUND IRON BAR		POND WARNING SIGN AND SAFETY STATION
LS	LIGHT STANDARD	IB	IRON BAR		MODULOC FENCE
PTL	PEDESTRIAN TRAFFIC SIGNAL	IP	IRON PIPE		CONSTRUCTION FENCE
					TREE PROTECTION FENCE
					CHAIN LINK FENCE

ES&C NOTES

1. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF THE INSPECTION.
2. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED / AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREAS. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, THEN ALTERNATIVE MEASURES SHOULD BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS. LSRCA ENFORCEMENT OFFICE SHOULD BE IMMEDIATELY CONTACTED.
3. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY AS STIPULATED IN THE CONTRACT DOCUMENTS.
4. SILT PROTECTION MEASURES ARE REQUIRED PRIOR TO THE COMMENCEMENT OF ANY AND ALL EXCAVATION ACTIVITIES
5. ADHERENCE TO CONSTRUCTION SEQUENCING IS REQUIRED AS PART OF THE ESC PLAN AND SHALL BE FOLLOWED BY THE CONTRACTOR UNLESS OTHERWISE APPROVED BY THE CONTRACT ADMINISTRATOR.
6. NO RUNOFF FROM THE CONSTRUCTION AREA AND UNVEGETATED AREAS SHALL BE DISCHARGED OFF SITE INTO ACTIVE AND/OR INACTIVE STORM SEWERS.
7. SEDIMENT CONTROLS TO BE INSPECTED BY THE CONTRACTOR DAILY AND AFTER EACH RAINFALL EVENT. SEDIMENT CONTROLS TO BE MAINTAINED AND REPAIRED BY THE CONTRACTOR UNTIL COMPLETION OF CONSTRUCTION AND SITE RESTORATION, AT HIS/HER OWN EXPENSE.
8. ALL ROADWAYS AND SIDEWALKS TO BE CLEANED OF SEDIMENTS RESULTING FROM CONSTRUCTION TRAFFIC FROM THE SITE EACH DAY.
9. THE CONTRACTOR IS TO PROVIDE EROSION PROTECTION AROUND ALL STORM AND SANITARY MHs AND CBs.
10. THE CONTRACTOR IS TO REMOVE TEMPORARY SEDIMENT CONTROLS FOLLOWING COMPLETION OF CONSTRUCTION AND REINSTATE AFFECTED AREAS TO EXISTING CONDITIONS OR BETTER.SEE RESTORATION PLAN FOR DETAILS.
11. DEWATERING PLAN SHALL BE IMPLEMENTED AND FULLY OPERATIONAL PRIOR TO UNDERTAKING THE WORKS
12. EVERY EFFORT WILL BE MADE TO AVOID REMOVAL OF EXISTING TREES.
13. THE CONTRACTOR SHALL IMPLEMENT, AT THE CONTRACTOR'S OWN EXPENSE, ANY ADDITIONAL EROSIONS AND SEDIMENTATION CONTROLS REQUIRED AS DEEMED APPROPRIATE BY THE CONTRACT ADMINISTRATOR, TORONTO AND REGION CONSERVATION AUTHORITY, AND CITY STAFF.

PHASING NOTES:

1. SETUP CONSTRUCTION FENCING ALONG ACCESS ROUTES AND SECURE ACCESS LOCATIONS TO POND.
2. SET-UP EROSION AND SEDIMENTATION CONTROLS AND DEWATERING SYSTEMS AS STATED IN THE DEWATERNG AND BYPASS NOTES
3. CONSTRUCTED TEMPORARY ACCESS INTO THE SWMF REMOVING ACCUMULATED SEDIMENT AS CONSTRUCTION PROGRESSES
4. REMOVE SEDIMENT FROM EXCAVATION LIMITS
5. EXCAVATE FOREBAY AREA TO CREATE SUMP TO MANAGE STORMWATER INFLOWS FROM INLET DURING LARGER EVENTS
6. CONSTRUCTION INLET SPILLWAYS
7. CONSTRUCT FLOW CONTROL BERM
8. EXCAVATE MAIN CELL
9. COMPLETE HICKENBOTTOM AND OUTLET WORKS CONSTRUCTION
10. COMPLETE OUTLET MAINTENANCE ACCESS ROAD CONSTRUCTION
11. COMPLETE REMOVAL OF TEMPORARY ACCESS ROAD AND REGARDING TO ACHIEVE PROPOSED GRADING
12. COMPLETE INLET MAINTENANCE ACCESS ROAD CONSTRUCTION
13. DECOMMISSION EROSIONS AND SEDIMENTATION CONTROLS AND DEWATERING SYSTEM
14. COMPLETE RESTORATION AND STABILIZATION AS SPECIFIED.

KEY PLAN

CONTRACTOR'S NOTES:

1. ALL DIMENSIONS ARE IN METRES AND UNLESS OTHERWISE INDICATED
2. DRAWINGS ARE NOT TO BE SCALED.
3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD AND SHALL REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY UPON FINDING.
4. THE EXACT LOCATION OF UTILITIES SHALL BE DETERMINED BY CONSULTING THE UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.
5. BENCHMARKS FOR LAYOUT ARE TO BE OBTAINED FROM THE CITY OF VAUGHAN ENGINEERING DEPARTMENT.

NOTE:
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1	30% DESIGN SUBMISSION	G.T.	SEP. 2020

UPDATES & REVISIONS

ENGINEERING COMPANY NAME:
Aquafor Beech Limited
#6-202-2600 SKYMARK Ave,
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55 REGAL ROAD, UNIT 3
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ENGINEER'S STAMP:

APPROVED AS TO FORM IN RELIANCE, UPON THE PROFESSIONAL SKILL AND ABILITY OF THE CONSULTING ENGINEERS AS TO DESIGN AND SPECIFICATIONS.

JACK GRAZIOSI, P.Eng., M.Eng.
DIRECTOR OF INFRASTRUCTURE DELIVERY

DATE

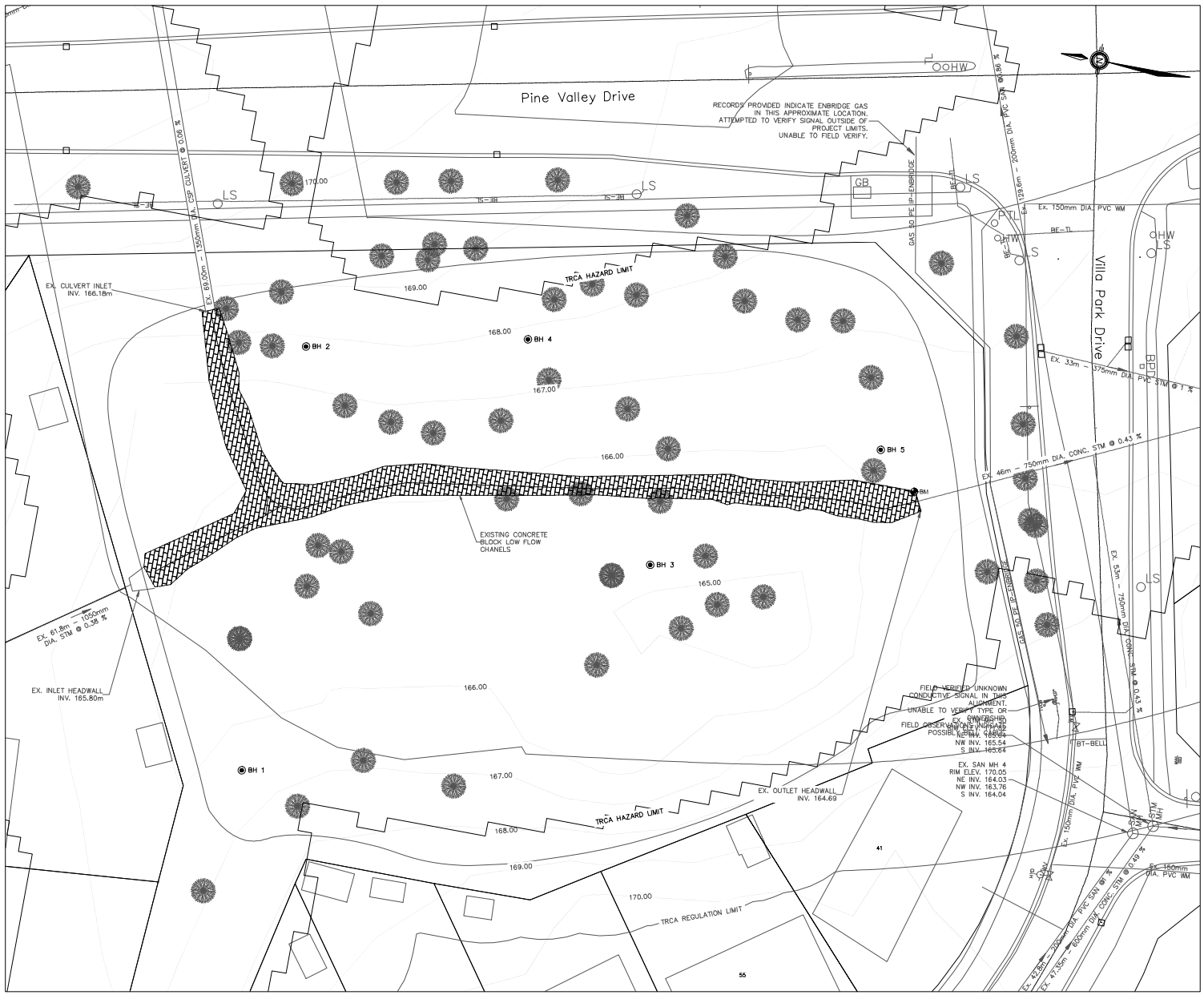
SCALE

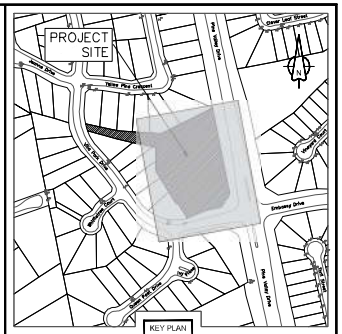
VILLA PARK POND

VAUGHAN
Infrastructure Delivery

DESIGNED & DRAWN BY: G.T.	CHECKED BY: W.C.	TENDER No. T17-___
SURVEYED BY: ___	APPROVED BY: D.M.	
SCALE:	PROJ. No. 17-07RW	DWG. No. 1 of 3

Acad File: D:\Desktop\Current Projects\City of Vaughan\66877.P – DMAF Phase 2\Design\Site #3\Site #3 – GT V2.dwg Layout: Sheet 1 – Notes





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ENGINEER'S STAMP:

APPROVED AS TO FORM IN RELIANCE, UPON THE PROFESSIONAL SKILL AND ABILITY OF THE CONSULTING ENGINEERS AS TO DESIGN AND SPECIFICATIONS.

JACK GRADISEL P.Eng., M.Eng.
DIRECTOR OF INFRASTRUCTURE DELIVERY

DATE

HORIZONTAL: 0 10 20 40

VILLA PARK POND

EXISTING CONDITIONS - EX-1

VAUGHAN
Infrastructure Delivery

DESIGNED & DRAWN BY: G.T.	CHECKED BY: W.C.	TENDER No. T17-___
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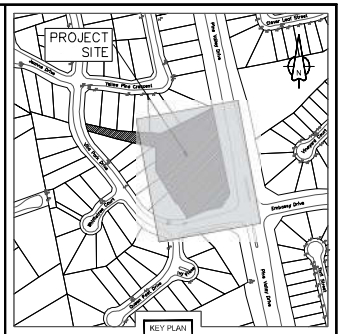
SCALE: HORIZONTAL: 1:250	PROJ. No. 17-07RW	DWG. No. 2 of 3

Plotted: Sep 30, 2021



Originally Estimated Permanent Pool Vol. (m^3)	Originally Estmated TSS Removal (2009)	Required Permanent Pool Vol. (m^3)	Provided Permanent Pool Vol. (m^3)	% Permanent Pool Vol. Obtained	Estimated TSS Removal from SWM Shield	Overal TSS Removal
4,230	110%	5,304	2,863	54%	58%	>80%

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JACK GRAZIOSI P.Eng., M.Eng.
DIRECTOR OF INFRASTRUCTURE DELIVERY

DATE

HORIZONTAL: 0 10 20 40

VILLA PARK POND

PROPOSED CONDITIONS - PR-1

VAUGHAN
Infrastructure Delivery

DESIGNED & DRAWN BY: G.T.	CHECKED BY: W.C.	TENDER No. T17-___
SURVEYED BY: ___	APPROVED BY: D.M.	
SCALE: HORIZONTAL: 1:250	PROJ. No. 17-07RW	DWG. No. 3 of 3